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ANNUAL REPORT

—— OF THE ——

BOARD OF VISITORS OF THE JAIL OF BALTIMORE CITY

—— TO THE ——

Mayor and City Council of Baltimore,

—— FOR THE ——

FISCAL YEAR ENDING DECEMBER 31st, 1898.

Maryland
JS584
.A1B3
1898

OFFICERS

——OF THE——

BALTIMORE CITY JAIL,

1898.

Board of Visitors:

HON. WILLIAM T. MALSTER, *Ex-officio.*
ISAAC S. FIELD, *President.*
THOS. W. PATTEN, *Secretary.*
MRS. SAMUEL D. SCHMUCKER.
JOHN M. STEWART.
CORNELIUS M. HOULT.
G. L. DEVED.

Warden:

JOHN R. BAILEY.

Physician:

JAMES C. CLARKE, M.D.

Clerk:

EMANUEL PREISS.

STANDING COMMITTEES:

Supplies:

JOHN M. STEWART, *Chairman.*
MRS. SAMUEL D. SCHMUCKER.
ISAAC S. FIELD.

Discipline:

ISAAC S. FIELD, *Chairman.*
CORNELIUS M. HOULT.
MRS. SAMUEL D. SCHMUCKER.

Finance:

CORNELIUS M. HOULT, *Chairman.*
THOS. W. PATTEN.
GEO. L. DEVED.

Sanitary:

THOS. W. PATTEN, *Chairman.*
CORNELIUS M. HOULT.
MRS. SAMUEL D. SCHMUCKER.

Repairs:

GEO. L. DEVED, *Chairman.*
JOHN M. STEWART.
CORNELIUS M. HOULT.

Committee on Annex:

MRS. SAMUEL D. SCHMUCKER, *Chairman.*

REPORT.

BALTIMORE CITY JAIL,

January 1, 1899.

To the Honorable the Mayor and City Council of Baltimore City:

GENTLEMEN: The Board of Visitors to the Baltimore City Jail have the honor of transmitting herewith their report in detail of the maintenance and management of the institution during the year ending December 31, 1898.

Exhibits A, B, C, D and E, attached to the report of the Warden, present the details of the average yearly, monthly and daily number of prisoners confined in the institution, the total number committed, with the nature of their offences as charged, the final disposition of the prisoners and the financial statement. We would call your special attention to the statement of cash receipts as shown in Exhibit A as this amount, $6,791.81, while an earning of the jail, is not credited as such.

The appropriation by the Mayor and City Council for the maintenance of the institution for 1898 was $56,000, all of which was expended as against $51,000 for the year 1897.

Necessary repairs and maintenance has caused a deficiency of $4,168.21, and we would earnestly and respectfully suggest to your Honorable Body the appropriation of $75,880, as we estimate that amount to be absolutely necessary to meet the absolute expenditures and necessary improvements of the current year.

As will be seen by the report of the Warden herewith submitted, the comfort, cleanliness, and health of the prisoners have been enhanced by the improvements in the towers of sections 1 and 2, which consisted of enlarging the windows, replastering the walls and

floors in cement, and introducing porcelain-lined sinks, galvanized-iron wash troughs, and closets of modern pattern. We recommend that similar improvements be made in the towers of sections 3 and 4, and believe that the placing of needle baths in all the sections as suggested by the Warden will be conducive to greater health of the inmates, while plans for obviating the necessity for carrying food and other supplies through the main hallway and for the safe storage of the records of the Jail are worthy of consideration.

A number of surgical cases presenting themselves during the year have demonstrated to Dr. James C. Clarke, the efficient and faithful physician to the Jail, the need of better hospital facilities. He is convinced that the addition of a second story to the present hospital building, to contain an operating room, laboratory, dispensary and physician's office, would facilitate the work of the office. This is an evident fact, and we recommend that in the estimate of your Honorable Body of the appropriation for the Jail provision be made for this improvement. The accounts have all been well cared for and kept, which is proof of the skill and attention of Mr. Emanuel Preiss, the Clerk.

The Board would invite your careful attention to the need of a separate building for the confinement of youthful offenders. This is a question of great moment which has confronted us for some time, and whilst we regret the necessity for such a building, yet it is absolutely necessary. We trust at no distant day the amount needed for such a building may be appropriated, in which event great good can be accomplished in the reformation of the juveniles. We would also call the attention of your Honorable Body to the recommendation that the plumbing and the unsanitary condition of the Annex be carefully looked into, otherwise an epidemic might visit us which would be hard to eradicate.

Respectfully submitted,

ISAAC S. FIELD, *President.*
THOMAS W. PATTEN, *Secretary.*
MRS. SAMUEL D. SCHMUCKER.
JOHN M. STEWART.
CORNELIUS M. HOULT.
GEORGE L. DE VED.

REPORT OF THE WARDEN.

BALTIMORE, December 31, 1898.

To the Honorable the Board of Visitors to the Baltimore City Jail:

GENTLEMEN: In compliance with the requirements of the Code, I beg to submit herewith my third annual report.

The number of prisoners committed for the action of the Criminal and the Federal Court was two thousand five hundred and thirty-nine (2,539); the number committed by the Police Justices for minor offenses was six thousand nine hundred and forty seven (6,947); making the total for the year nine thousand four hundred and eighty-six (9,486), and showing a notable decrease in number from the record of 1897.

The daily average for the year was six hundred and forty-nine (649), an increase of seventy-two (72) over 1897, of 113 over 1896 and of 152 over 1895. This steady accretion with each successive year is to be attributed to the longer sentences now imposed on the prisoners than in the past.

The accounts still due to the credit of the Jail at the end of the year are as follows:

Chas. S. Beebe, Contract Labor			$1,694 87
United States Marshal, Board of Prisoners			444 70
Baltimore County	"	"	298 00
Anne Arundel County	"	"	30 50
Somerset County	"	"	17 25
Wicomico County	"	"	8 50
Prince George's County	"	"	5 50
St. Mary's County	"	"	4 50
Carroll County	"	"	3 00
Kent County	"	"	2 00
Cecil County	"	"	1 00
			$2,509 82

The report of Dr. James C. Clarke, Physician of the Jail, appended herewith, shows that the standard of health, which heretofore was good, has been fully maintained.

Following is an estimated summary of expenditures that will be required for the maintenance of the institution for the coming year:

Officers' Salaries	$30,880
Subsistence of Prisoners	20,000
Fuel and Light	5,000
Clothing, Dry Goods and Shoes	4,000
Machinery and Repairs	4,500
Hospital, Drugs, etc	1,500
Sanitary	2,000
Incidental Expenses	3,000
Subsistence Sick Prisoners	1,500
Repairs to Hospital Building	1,000
Beds and Bedding	2,500
	$75,880

The full number of prisoners has been employed on the contract with Mr. Charles S. Beebe. All other sentenced prisoners have been used in the various departments of the institution.

In this connection I wish to call your attention to the introduction of a shoemaking and repairing department that we started in August of the present year.

The school for boys, which was established last year, is also showing gratifying results in the improvement of mind of those committed to our custody.

Through the kindness of the Enoch Pratt Library, Mr. Wm. H. Morriss, Secretary of the Y. M. C. A., and other friendly sources, about thirty-five hundred volumes have been added to our collection of books.

They have all been carefully catalogued by prisoners, who, from time to time, were appointed to this work, and are freely and profitably circulated among the inmates.

The work allotted to the female department has been carefully superintended and a list of same follows:

Pillow Cases Made	1,152
" Ticks "	294
Bed Sheets "	694
" Ticks "	342
Overalls Made	1,023
Shirts "	1,200
Dresses "	123
Towels "	552
Repairs "	3,712
Miscellaneous Articles Made	106
Number Pieces Laundried	90,701
Total	99,899

The following changes and improvements in the cause of better sanitation have been instituted: The windows of the towers in sections Nos. 1 and 2 were enlarged, thereby increasing circulation; walls, ceilings and floors replastered in cement; porcelain-lined sinks, galvanized iron wash troughs, and water-closets of modern pattern.

These changes have in a large measure corrected the faults previously existing, and have added much to the comfort and cleanliness of the inmates.

Among other improvements may be mentioned the enclosure of the Madison street gate with a wooden fence, which forms a double entrance and minimizes the chances of escape.

Judging from the disproportionate number of sick there seemed to be an unhealthful condition prevailing in the lower tier of cells on section No. 2, and in order to arrest any local defect, we replaced the floors with hard wood, lined with mineral wool. Since the change the cells are in a much better condition than formerly.

I recommend that the same kind of improvements recently accomplished in the sanitary system of towers Nos. 1 and 2 be placed in towers Nos. 3 and 4, also that needle baths be placed in all the sections.

The records of the Jail are unsafe in case of fire, nor is there proper storage room in which to file them in good shape; I therefore suggest the construction of a vault at the front gate as a safe and proper repository for all Jail records.

I also recommend the addition of a story to the Hospital, to be used for an operating room and office for the physician. This improvement is urgently needed, reasons for which will be fully detailed in the report of the physician.

Another needed improvement to obviate the necessity of carrying the food and other supplies through the main hall is the cutting of doorways in the walls of the lower hall to each of the sections.

In concluding I wish to thank the members of the Board and the officers of the institution for aid rendered me during the year.

Respectfully submitted.

JOHN R. BAILEY, *Warden.*

EXHIBITS.

EXHIBIT A.

Being a Summary of Receipts and Expenditures for the Year Ending December 31, 1898; also a Statement Showing the Per Capita Cost of Maintaining Prisoners, Both Yearly and Daily, and the Per Capita Cost of Same for the Different Departments.

Mayor and City Council, annual appropriation	$56,000 00	Officers' salaries	$28,500 00
Chas. S. Beebe, contract labor	4,929 44	Subsistence of prisoners	13,092 01
United States Marshal, board of prisoners	1,533 80	Fuel and light	2,983 82
Prince George's County, " " "	129 00	Clothing, dry goods and shoes	2,418 65
Frederick " " " "	97 50	Machinery and repairs	2,395 94
Charles " " " "	53 50	Special sanitary improvements	1,970 11
Somerset " " " "	6 00	General sanitary account	1,516 21
Harford " " " "	6 00	Subsistence of sick prisoners	1,345 80
Howard " " " "	10 50	Incidental expense account	1,078 35
Sale of junk	23 57	Drugs and hospital account	699 11
Board for stowaway	2 50	Revenue (paid to City Comptroller)	6,791 81
	$62,791 81		$62,791 81

EXHIBIT A.—Concluded.

	Yearly.	Daily.	Yearly.	Daily.
The cost of maintaining prisoners per capita was	$86.286	.2364	$92.709*	.2539*
For officers' salaries alone it was	$43.914	.1203	$45.562	.1248
For subsistence of prisoners it was	20.172	.0552	22.255	.061
For fuel and light "	4.598	.0126	5.431	.0149
For clothing and dry goods "	3.727	.0102	4.10	.0112
For machinery and repairs "	3.692	.0101	3.917	.0107
For special sanitary improvements it was	3.036	.0083	3.94	.0108
For general sanitary work "	2.335	.0064	2.418	.0066
For subsistence of the sick "	2.074	.0057	2.266	.0062
For incidental expenses "	1.661	.0046	1.661	.0045
For hospital account, drugs, "	1.077	.0030	1.159	.0032
	$86.286	.2364	$92.709	.2539

*In the last two columns the amount of the deficiency, $4,168.21, added to the regular appropriation, $56,000, produces the results as indicated above in the per capita cost.

EXHIBIT B.

Showing the Number of Prisoners Committed for Various Causes During the Year Ending December 31, 1898.

	White.			Colored.			Grand Total.
	Males.	Females.	Total.	Males.	Females.	Total.	
Absent from drill of Militia.	6		6				6
Adultery					1	1	1
Aiding prisoners escape	1		1				1
Arson	9		9		1	1	10
Assault, common	418	15	433	620	88	708	1,141
" indecent	4		4	4		4	8
" and biting (Mayhem)	1		1	4	2	6	7
" on officer	54		54	34	7	41	95
" on wife	17		17	2		2	19
" to kill	50	1	51	62	2	64	115
" to rob	12	1	13	4		4	17
Assuming to United States office	1		1				1
Attempt to steal	1		1				1
Bastardy	1		1	2		2	3
Bawdy house	2	7	9	5	21	26	35
Begging	10		10				10
Bigamy	3		3	3		3	6
Burglary	69	1	70	76	2	78	148
Chinese exclusion act	3		3				3
Committing nuisance	15		15	3		3	18
Common thief				3		3	3
Concealed weapon	12		12	45	1	46	58
Conspiracy	4		4				4
Contempt of court	16	1	17	5	2	7	24
Cruelty to animals	10		10	14		14	24
Cruelty to seamen	4		4				4
Cursing and swearing	352	53	405	219	170	389	794
Defrauding hotel	4		4				4
Deserters	6		6	1		1	7
Disposing mortgaged property	2	1	3	4		4	7
Disturbing peace	1,032	79	1,111	988	381	1,369	2,480
Disturbing public worship	4		4	1		1	5
Drunk	903	124	1,027	136	44	180	1,207
Election laws	6		6	11		11	17
Embezzlement	33		33	1		1	34
Employing minors to beg	1		1				1
Enticing for immoral purposes	3	3	6		3	3	9
False alarm of fire	3		3	6		6	9
False pretences	38	2	40	11	5	16	56
Fast driving	6		6	5		5	11
Felony	1		1	1		1	2
Felonious entry	23		23	29	2	31	54
Firing pistol	6		6	14		14	20
Forgery	8		8	1		1	9

EXHIBIT B.—Concluded.

	White.			Colored.			Grand Total.
	Males.	Females.	Total.	Males.	Females.	Total.	
Fortune-telling	1		1				1
Fraudulent trick	17	2	19	1		1	20
Fugitive from justice	2		2	1		1	3
Gambling	11		11	116		116	127
Indecent exposure	10		10	10	2	12	22
Incorrigible children				28		28	28
Insubordination	1		1	3		3	4
Internal Revenue laws	1		1				1
Larceny	575	31	606	683	151	834	1,440
Liquor laws	30	2	32	4	1	5	37
Lottery laws	1		1	5	1	6	7
Malicious destruction property	43	1	44	17	5	22	66
Murder and accessory	8		8	16	1	17	25
Obscene language	95	21	116	45	57	102	218
Obstructing street passengers	67	6	73	52	9	61	134
Obstructing street cars				1		1	1
Oyster laws	3		3				3
Passing counterfeit money	7	1	8	8		8	16
Pension laws				1		1	1
Perjury	20		20	5		5	25
Pickpockets	16	2	18	8		8	26
Postal laws	4		4	1		1	5
Rape	14		14	18		18	32
Receiving stolen goods	12		12	7	2	9	21
Robbery	42		42	26	10	36	78
Rogue and vagabond	1		1	6		6	7
Selling goods without license	24		24				24
Selling unsound meat	1		1				1
Sleeping in market-house	12		12				12
Smuggling	1		1				1
Sodomy	2		2				2
Stowaway	1		1				1
Suspicious character	3		3	1		1	4
Threatening bodily harm	15		15	3		3	18
Throwing missles	6		6	44		44	50
Throwing nauseous liquors on street	1		1	1		1	2
Unlawfully on railroad cars	123		123	48		48	171
Unlawfully on street cars	2		2	6		6	8
Vagrants	155	53	208	49	24	73	281
Violating city ordinances, (unclassified)	5	1	6	1		1	7
Wife desertion	21		21	4		4	25
Witnesses	26		26	13	4	17	43
	4,533	408	4,941	3,546	999	4,545	9,486

EXHIBIT C.

Showing the Number of Prisoners Committed and How Discharged for the Year Ending December 31, 1898.

		White Males.	White Females.	Colored Males.	Colored Females.	Total.	Grand Total.
Number of prisoners in Jail January 1..		309	20	247	54	630	
Number of prisoners received..		4,533	408	3,546	999	9,486	
		4,842	428	3,793	1,053	.....	10,116
Released by	Circuit Court No. 2	1	.....	.....	.....	1	
	Criminal Court, bailed	176	11	84	33	304	
	Criminal Court, bailed on parole	4	.....	8	.....	12	
	Criminal Court, bailed pending motion new trial.	6	.....	2	.....	8	
	Criminal Court, bailed pending sentence	2	.....	1	.....	3	
	Criminal Court, fines paid.	21	.....	.....	8	29	
	Criminal Court, insolvency proceedings	1	.....	2	.....	3	
	Criminal Court, not guilty confessed by State	1	.....	1	.....	2	
	Criminal Court, paroled	17	.....	27	1	45	
	Criminal Court, stet	52	7	26	14	99	
	Criminal Court, verdict not guilty	141	7	115	27	290	
	Criminal Court, witnesses.	12	1	13	1	27	
	Expiration of sentence	1,998	212	1,653	466	4,329	
	Grand Jury	246	13	206	51	516	
	Orphans' Court	3	.....	.....	.....	3	
	Pardon	10	1	2	1	14	
	Police Justices	1,322	88	814	315	2,539	
	Requisition from Governor of Delaware	2	.....	.....	.....	2	
	Suicide	1	.....	.....	.....	1	
	United States Marshal	48	1	11	.....	60	
	Writ habeas corpus	6	.....	7	.....	13	
Delivered to	Bayview Asylum	3	4	1	2	10	
	City Hospital	.....	.....	.....	1	1	
	County Sheriffs	9	.....	9	.....	18	
	House Correction	199	56	114	24	393	
	House Reformation	.....	.....	41	.....	41	
	House Refuge	1	.....	.....	.....	1	
	Industrial Home for Colored Girls	.....	.....	.....	1	1	
	Penitentiary	63	1	69	14	147	
	St. Mary's Industrial School	3	.....	.....	.....	3	

EXHIBIT C.—Concluded.

	White Males.	White Females.	Colored Males.	Colored Females.	Total.	Grand Total.
Died in Jail	1	.....	4	.....	5	
Escapes	1	.....	1	.....	2	
Released for trial before Police Justices	238	7	243	20	508	
Transferred home on account of sickness	.....	.....	3	3	6	
Remaining in Jail Dec. 31, 1898.	254	19	336	71	680	
	4,842	428	3,793	1,053	.....	10,116

EXHIBIT D.

Showing the Monthly and Daily Average Number of Prisoners for the Years 1895, 1896, 1897 and 1898; also the Highest and Lowest Number in Jail Each Year.

	1898.	1897.	1896.	1895.
January	637	577	531	562
February	651	528	530	495
March	683	584	550	528
April	674	539	558	507
May	690	514	529	483
June	673	550	529	457
July	677	569	521	486
August	653	662	566	473
September	678	656	533	474
October	609	575	495	447
November	563	575	505	512
December	598	595	541	539
Daily average each year	649	577	536	497

Highest number		March 19, 1898	738
Lowest	"	November 11, 1898	526
Highest	"	August 16, 1897	743
Lowest	"	May 27, 1897	490
Highest	"	December 28, 1896	639
Lowest	"	October 24, 1896	451
Highest	"	December 29, 1895	617
Lowest	"	October 15, 1895	420

EXHIBIT E.

Showing the Occupation or Trade of the Prisoners Received in the Institution During the Year on Conviction and Sentence by the Criminal Court.

	White.		Colored.			
	Males.	Females.	Males.	Females.	Total.	Grand Total.
Actor			1		1	
Agent	1				1	
Attorney	1				1	
Bakers	6		2		8	
Barbers	2		6		8	
Barkeepers	7				7	
Basket-makers	1				1	
Blacksmiths	5				5	
Boiler-makers	3				3	
Book-keepers	5				5	
Bootblack			1		1	
Bottlers	2	1			3	
Brakesmen	2		1		3	
Brass-finisher	1				1	
Bricklayers	6				6	
Brick-makers			2		2	
Brokers	1				1	
Broom-makers	3				3	
Butchers	5		3		8	
Canmakers	4		1		5	
Candy-makers	2	1			3	
Canners	1		1		2	
Carpenters	4				4	
Carriagesmith	1				1	
Chair-makers	1		1		2	
Chimney sweep			1		1	
Cigar-makers	4				4	
Clerks	19				19	
Clothing-cutter	1				1	
Cooks	5	1	8	8	22	
Coopers	2				2	
Currier	1				1	
Draughtsman	1				1	
Druggist	1				1	
Dyer	1				1	
Electrician	1				1	
Engineers	5				5	
Engraver	1				1	
Farmers	6		3		9	
Firemen	6		4		10	
Florists	1		1		2	
Gardeners	2				2	
Glass-worker	1				1	
Horseshoer	1				1	
Hostlers	2		7		9	

EXHIBIT E.—Continued.

	White.		Colored.			
	Males.	Females.	Males.	Females.	Total.	Grand Total.
Hucksters	2				2	
Iron-moulders	5				5	
Jockey	1				1	
Junk dealer			1		1	
Laborers	63		227		290	
Laundress's				4	4	
Machinists	9				9	
Marble cleaner	1				1	
Marble cutter	1				1	
Medical student	1				1	
Merchant	1				1	
Messengers	1		2		3	
No occupation	6	7	25	33	71	
Oyster packers	2				2	
Painters, house	9				9	
Painter, coach	1				1	
Paper dealer	1				1	
Paperhangers	3				3	
Photographer	1				1	
Physicians	3		1		4	
Pianist				1	1	
Plasterers	2				2	
Plumbers	5				5	
Printers	5				5	
Porters			5		5	
Railroad foreman	1				1	
Salesmen	5				5	
Salesmen, traveling	4		1		5	
Scissors-grinders	2				2	
Seamen	7		17		24	
Servants		4		20	24	
Shipwrights	2				2	
Shirt-cutters	2				2	
Shirt-maker	1				1	
Shoemakers	6		1		7	
Stevedores	4				4	
Steward	1				1	
Stone-cutters	2				2	
Stone mason			1		1	
Tailors	11		1		12	
Teamsters	12		11		23	
Telegraph operator	1				1	
Tinners	5				5	
Tobacco stripper	1				1	
Upholsterer			1		1	
Waiters	4	1	29		34	
Watchmakers	3				3	
Wood carvers	2				2	
Woolen weaver	1				1	
Total	325	15	366	66		772

EXHIBIT E.—Continued.

Showing the Time for which They were Sentenced, the Number of Times Convicted and Age at Time of Committal.

	White.		Colored.			
	Males.	Females.	Males.	Females.	Total.	Grand Total.
1 month or less	103	5	117	22	247	
2 months	47	1	38	4	90	
3 "	35	1	54	7	97	
4 "	19	2	16	7	44	
5 "	7	.....	2	1	10	
6 "	53	2	49	12	116	
7 "	2	.....	3	1	6	
8 "	4	.....	12	.....	16	
9 "	1	.....	4	.....	5	
10 "	1	1	2	.....	4	
12 "	40	1	50	8	99	
13 "	1	1	.....	.....	2	
15 "	3	.....	3	1	7	
18 "	6	1	13	2	22	
24 "	3	.....	3	.....	6	
30 "	.....	.....	.....	1	1	
Total	325	15	366	66	.....	772
First time convicted	240	12	731	57	540	
Second " "	58	3	68	7	136	
Third " "	18	.....	35	1	54	
Fourth " "	6	.....	17	.....	23	
Fifth " "	1	.....	6	1	8	
Sixth " "	2	.....	2	.....	4	
Seventh " "	.....	.....	3	.....	3	
Eighth " "	.....	.....	2	.....	2	
Ninth " "	.....	.....	2	.....	2	
Total	325	15	366	66	.....	772
9 years old	.....	.....	1	.....	1	
10 " "	.....	.....	2	.....	2	
11 " "	.....	.....	3	.....	3	
12 " "	.....	.....	1	.....	1	
13 " "	.....	.....	3	.....	3	
14 " "	.....	.....	6	.....	6	
15 " "	.....	.....	13	2	15	
16 " "	2	.....	12	1	15	
17 " "	5	1	16	4	26	

EXHIBIT E.—Continued.

	White.		Colored.			Grand Total.
	Males.	Females.	Males.	Females.	Total.	
18 years old	11	1	18	6	36	
19 " "	7		27	5	39	
20 " "	11		16	3	30	
21 " "	17	1	24	5	47	
22 " "	25	1	19	4	49	
23 " "	13	1	30	3	47	
24 " "	11		12	5	28	
25 " "	9	1	15	1	26	
26 " "	12	1	10	5	28	
27 " "	14	1	13	2	30	
28 " "	13		17	1	31	
29 " "	5	1	9	2	17	
30 " "	11		10	1	22	
31 " "	5	1	3	1	10	
32 " "	14		6	3	23	
33 " "	9		4	1	14	
34 " "	4		6		10	
35 " "	12	2	8		22	
36 " "	4		6		10	
37 " "	6		4	2	12	
38 " "	16	2	7		25	
39 " "	5		5	1	11	
40 " "	8		2	2	12	
41 " "	6		1		7	
42 " "	11		2	3	16	
43 " "	4		2		6	
44 " "	4		3	1	8	
45 " "	9		4		13	
46 " "	2		1		3	
47 " "	4		5		9	
48 " "	8		2		10	
49 " "	3	1	2		6	
50 " "	1		1		2	
51 " "	2				2	
52 " "	2		2		4	
53 " "	3		2		5	
54 " "	1		1		2	
55 " "	4		1	2	7	
56 " "	3				3	
57 " "	1		2		3	
58 " "	1		1		2	
59 " "			1		1	
60 " "	2				2	
61 " "			1		1	
62 " "	2		1		3	
63 " "			1		1	
65 " "	1				1	
68 " "	1		1		2	
Age unknown	1		1		2	
Total	325	15	366	66		772

EXHIBIT E.—Concluded.

Showing the Native and Foreign Born, Married and Single, if They Can Read and Write, or if Addicted to the Use of Intoxicants, and Which of Their Parents Were Living Before They Were 15 Years of Age.

	White.		Colored.		Total.	Grand Total.
	Males.	Females.	Males.	Females.		
Native born	280	13	361	66	720	
Foreign	45	2	5	.....	52	
Total	325	15	366	66	.....	772
Married	115	8	93	18	234	
Single	210	7	273	48	538	
Total	325	15	366	66	.....	772
Total abstainers	136	8	164	33	341	
Moderate drinkers	120	7	143	18	288	
Habitual "	69	.....	59	15	143	
Total	325	15	366	66	.....	772
Can read	6	2	18	8	34	
Can read and write	286	11	251	34	582	
Can neither read nor write	33	2	97	24	156	
Total	325	15	366	66	.....	772
Both parents living	183	7	200	31	421	
" " dead	67	2	74	10	153	
Only mother living	43	4	60	19	126	
" father "	32	2	32	6	72	
Total	325	15	366	66	.....	772

REPORT HOSPITAL DEPARTMENT.

BALTIMORE, December 31, 1898.

To the President and Board of Visitors, Baltimore City Jail:

GENTLEMEN: I have the honor to respectfully submit the following report for the year ending December 31, 1898; a tabulated statement will be found in the following pages:

The number treated during the year was 6,477. The total number prescribed for during the year was 18,494, a daily average of 51; mortality for the year was 93-100 per 1,000, or 62-100 per 1,000. John Meddinger and Sebastian Buenger, who died at this institution, had not applied for treatment.

During the year we were called upon to treat two contagious cases, two men committed with diphtheria, which were at once detected, isolated and the entire section quarantined, thus avoiding any spread of the disease.

The sanitary condition of the institution is greatly improved by the ventilation of the towers on sections 1 and 2, and the erection of sanitary closets and water troughs, and I recommend similar work in sections 3 and 4.

The diet of the prisoners has been varied and improved, adding to the hygiene of the institution.

A number of surgical cases have presented themselves during the year, which has demonstrated the need of improvement in our limited hospital facilities.

I strongly recommend the addition of a second story on present hospital building, to contain operating room, laboratory, dispensary and physician's office, which would add greatly to the results of the department and facilitate the work.

I respectfully call the Board's attention to the unsanitary condition of the Annex and suggest complete renovation of the plumbing and present arrangements.

Thanking the Board for their many kindnesses, and the Warden and deputies for their attention and assistance,

I am, very sincerely,

JAMES C. CLARKE, M.D.

STATISTICAL SUMMARY.

FROM JANUARY 1 TO DECEMBER 31, 1898.

Abscess	10	Fistula	2
Alcoholism	343	Fracture in Fore Arm	1
Amenorrhœa	10	Fracture of Thumb	1
Amputation of Fingers	1	Furuncle	48
Anaemia	119	Galactirrhœa	3
Asthma	20	Gastritis	6
Biliousness	52	Gleet	27
Bites, (Man and Dog)	13	Gonorrhœa	185
Bronchitis, Acute	900	Hemorrhage	7
Bronchitis, Chronic	142	Hemorrhoides	58
Bubo	16	Hernia	7
Burn	24	Herpes Circinatus	3
Cancrum Oris	21	Hypertrophy of Heart	2
Catarrh, Nasal	213	Hysteria	2
Cataract	2	Inanition	1
Cephahalgia	16	Indigestion	82
Chancroid	13	Inflammation of Bowels	1
Congestion of Liver	5	Insanity	7
Congestion of Kidney	8	Insomnia	16
Conjunctivitis	49	Internal Injury	39
Constipation	498	Jaundice	9
Contusion	261	La Grippe	111
Cystitis	2	Laryngitis	8
Diarrhœa	60	Leucorrhœa	62
Diarrhœa, Chronic	6	Lumbago	21
Diphtheria	2	Malaria	330
Dislocations	14	Mania-a-potu	2
Dysmenorrhœa	22	Menorrhagia	35
Dyspepsia	55	Mitral Insufficiency	1
Dysentery	17	Morphine Habit	144
Earache	103	Myalgia	264
Eczema	222	Necrosis of Ulna	3
Epilepsy	13	Nephritis	4
Epistaxis	3	Neurasthænia	128
Erysipelas	12	Oedema	22
Felon	22	Orchitis	28

STATISTICAL SUMMARY—Continued.

Oyster Shell Poisening	2	Strangury	22
Paralysis	1	Stricture, Urethral	29
Pedi-cula Pubi	102	Synovitis	1
Periostitis	1	Syphillis	90
Pharyngitis	6	Tape Worm	4
Phimosis	2	Teeth Extracted	135
Phthisis	24	Tonsilitis	294
Pleurisy	1	Toothache	93
Pneumonia	4	Ulcer Cornea	4
Pregnancy	7	Ulcer Syphilitic	3
Rheumatism, Acute	298	Ulcer Varicose	1
Rheumatism, Chronic	65	Varicose Veins	1
Rheumatism, Syphilitic	1	Valvular Disease of Heart	31
Scrofula	22	Wounds, Contused	9
Sinus	1	Wounds, Incised	51
Spermatorrhœa	3	Wounds, Lacerated	94
Sprains	64	Wounds, Pistol	1
Stomatitis	59	Wounds, Stab	4

RECAPITULATION.

FOR YEAR ENDING DECEMBER 31, 1898.

Month.	White Males.	White Females	Colored Males.	Colored Females	Total.
January	219	32	162	85	498
February	212	34	183	79	508
March	271	47	244	79	641
April	247	36	293	96	672
May	181	35	263	115	594
June	131	32	156	116	435
July	126	41	162	125	454
August	135	31	225	126	517
September	120	23	177	127	447
October	114	33	200	122	469
November	204	28	231	99	557
December	281	36	259	109	685
Total	2241	408	2555	1273	6477

SUMMARY.

White males	2,241	
White females	408	
Colored males	2,555	
Colored females	1,273	
		6,477

TRANSFERS TO BAY VIEW.

White males	3	
White females	4	
Colored males	1	
Colored females	1	
		9

TRANSFERS TO CITY HOSPITALS.

Colored females	1	
		1

TRANSFERS HOME.

Colored males	3	
Colored females	3	
		6

RESULT OF TREATMENT.

Cured	5,141	
Relieved	1,309	
Died	6	
Under treatment December 31	21	
		6,477

Total number prescribed for	18,494
Total number of special meals	7,754

DEATHS.

John Meddinger, white, 5.05 P.M., February 2. Suicide.

Sebastian Buenger, white, 7.30 P.M., June 18. Hypertrophy of the heart.

Henry Williams, colored, 1 A.M., June 24. Phthisis.

Louis Jones, colored, 8.20 P.M., August 4. Mitral insufficiency.

Edward Peirson, colored, 8.45 P.M., September 6. Phthisis.

Moses Crosby, colored, 10.45 P.M., September 28. Phthisis.

ANNUAL REPORT

—OF THE—

CITY LIBRARIAN

—TO THE—

Mayor and City Council of Baltimore,

—FOR THE—

FISCAL YEAR ENDING DECEMBER 31st, 1898.

REPORT.

To the Honorable the Mayor and City Council of Baltimore:

GENTLEMEN: Having assumed charge of the Library on April 24, I am unable to give as full a report as I should wish.

I regret to say that its condition is not one for congratulation. The books and accounts kept with the several departments of the city were in fairly good shape, although some minor errors appeared, which were eliminated after a careful checking up. A more perfect system is desirable and will be inaugurated with the beginning of the new year.

The different rooms of the Library are not in good condition; those on the third floor occupied by the Librarian and containing most of the books of reference are dirty, the carpets are worn and ragged, and much material is stored there which should be otherwise provided for. Some additional space has been obtained, however, and soon after the first of the year a general cleaning up will be given these rooms and they will be thoroughly renovated.

One very desirable improvement that was recommended by my predecessor has been made, viz.: The removal of the maps, plats and street books from the fourth floor to the alcove on the third floor, which has been partitioned off for that purpose. These maps, plats and street books are among the most valuable records of the city, and if lost or destroyed by fire cannot be replaced. As all the shelving and cases are of wood, fire would be certain to destroy these records, and it would seem that ordinary prudence would dictate some more careful provision against their loss. I respectfully recommend that an appropriation be made to provide metallic shelving and cases. The cost would be approximately about $1,000.00.

The rooms on the fourth floor used by the Librarian are seven in number, and are filed with the various records, reports, and documents of the different departments of the city.

Room No. 1 contains books and records of the City Register, City Comptroller, and Court Orders, which have been turned over to the City Librarian for safe keeping. It is not in good order, the books and cases being scattered about in great confusion. Very frequently the Librarian is summoned to bring some of these papers into court as evidence in cases in which the the city is a party, and it is therefore important that they should be properly arranged and cared for. As soon as possible this will be done.

Rooms 3 and 4 contain books and records of Water Department, Council papers, and books and records from the Mayor's Office; also old copies of lists of registered voters of several years. These rooms are in even worse condition than No. 1, and will be put in shape at an early date.

In Room 5 is stored extra copies of Ordinances and Resolutions, Journals of both Branches, and old City Directories. It is in fairly good condition.

Room No. 6 contains the surplus copies of the Mayor's Messages and Annual Reports of the various departments; also copies of United States Census and other government reports, and is in good condition.

In Room No. 7 is stored the records of the City Collector, tax schedules, Appeal Tax Court papers, reports and papers of the Street Cleaning Department, Building Inspector and other departments; also bound copies of the daily papers of Baltimore, extra copies of the City Code, paving journals, etc., and a large amount of miscellaneous matter, all of which requires arranging and putting in shape, and the room cleaned and renovated.

As fast as practicable, with the present limited force in the office, all the rooms will be put in order and a general index made of all the books, records and papers of every description in the custody of the Librarian.

The contracts for stationery, books and printing for 1899 have been awarded at reasonable and satisfactory prices.

As far as possible, all articles needed for the city have been included in the contracts in itemized form, a full list having been obtained from each department. The advantage of this is, that

the city will obtain many items at a much less price than if purchased outside the contract as *special*, and does away with all controversy between the contractor and the Librarian for such special items.

A slightly increased appropriation has been asked for, for the reason that many new books and forms not before used are required by the New Charter, and for the additional reason that all bills purchased this year must be paid out of the appropriation for 1899, as the provision of the Charter prohibiting any debt being carried over will, in my judgment, require all purchases to be settled for in the current year, and will not allow bills bought in the closing months to be carried over and paid out of the succeeding year, as has been the custom heretofore.

Another important matter to which I beg to call your attention is the fact that the Library has never received any copies of the New City Charter. As this is the first New Charter for one hundred years, it is very necessary that the Library should have a sufficient number to furnish the different city officials, and also to send the large cities of the United States a copy in return for like courtesies on their part. There should also be at least one hundred copies on file in the Library for distribution from time to time, as may be required. I respectfully recommend that an appropriation be made to print five hundred additional copies for the purposes above named.

There are in the Library about thirty-one thousand volumes, bound books, records and printed matter. One of the needs of this office is a complete index of all the books and records entrusted to the care of the Librarian. This work will be commenced at an early day, and completed as soon as possible.

It is the purpose of your present Librarian to put the several rooms in the best condition possible, and make it as presentable and useful as the limited means at his disposal will allow.

I append herewith a list of the books received and distributed during the year; also a statement showing the amounts expended by the different departments of the city for stationery, blank books and printing. When the large amount of business transacted by a

city the size of Baltimore is taken into consideration, it will be seen that these expenses are very small, comparatively.

Reference to the library reports of the different cities will show that most cities of the size of Baltimore spend vastly more money for books, printing, etc., than we do, and have much greater facilities.

All of which is respectfully submitted.

B. L. TURNER, *City Librarian.*

DOMESTIC PUBLICATIONS RECEIVED DURING 1898.

200 Copies Mayor's Message and Annual Reports for 1897.
150 Copies Ordinances and Resolutions, 1896–97.
1 Copy Smithsonian's Report, year 1890.
1 Copy Maryland Reports, No. 85.
1 Copy Maryland Geological Survey.
1 Copy Mayor of Cincinnati's Report, 1895.
1 Copy Governor of North Carolina's Report, 1895.
1 Copy Baltimore American, July to December, 1897.
1 Copy Baltimore Herald, July to December, 1897.
1 Copy Baltimore News, July to December, 1897.
1 Copy Baltimore Daily Record, 1890 to 1897.
200 Copies First Branch Council Journal, 1896–97.
1 Copy Philadelphia Ordinances, 1896.
1 Copy Philadelphia Annual Reports, 1897.
1 Copy Maryland Institute Reports, 1852–61.
1 Copy Manual of Signals: By J. Albert Meyer.
1 Copy Scribner's Atlas of United States.
1 Copy Bradley's Atlas of World.
1 Copy Gray's Atlas of United States and World.
1 Copy Atlas of Maryland: Martinet, Wallings and Gray.
1 Copy National Atlas.
1 Copy People's Atlas of the World.
1 Copy Rand, McNally & Co.'s Business Atlas.
200 Copies Second Branch Council Journal, 1896–7.
1 Copy Municipal Reports, San Francisco, 1896–7.
1 Copy Report of State Historian, New York.
1 Copy Report of Fisheries Commission, New York.
1 Copy Report of the State Botanist, New York.

1 Copy Report of State Librarian, New York, 1893–6.
1 Copy All Papers Relating to McDonogh School, 1897 to 1899.
1 Copy Eleventh Annual Report Interstate Commerce Commission.
1 Copy Annual Report, United States Bureau of Education, Industrial and Fine Arts.
1 Copy Annual Report State Librarian New York, 1897.
1 Copy Board of Trade Manual, Providence, R. I.
1 Copy Report of Chief Engineer, War department.
1 Copy History of Maryland Volunteers in Civil War.
1 Copy The Case of Venezuela.
1 Copy Baltimore Chamber of Commerce Report, 1897.
8 Vols. Mineral Resources of United States from United States Geological Survey.
3 Vols. Geological & Geographical Survey of Territories.
1 Vol. Lands of the Arid Regions.
1 Vol. Vertebræ of Tertiary Formations of the West.
1 Vol. The Cretaceous and Tertiary Flora.
1 Vol. Tertiary Insects of North America.
14 Vols. Tenth Census of the United States.
1 Vol. Statistics of Manufactures, United States.
1 Vol. Maps of Vital Statistics of United States.
1 Copy City Year Book, New Haven, Conn., 1897.
1 Copy Twenty-seventh Report Insurance Commissioner of Maryland.
1 Copy Laws of Maryland, 1898.
1 Copy Maryland Senate Journal, 1898.
1 Copy Maryland House Journal, 1898.
1 Copy House and Senate Documents, 1898.
1 Copy City Year Book, Charleston, S. C., 1897.
1 Copy Michigan State Board of Health Report, 1896.
1 Copy Baltimore Chamber of Commerce Report, 1897.
1 Copy United States Life Saving Service Report, 1895.
1 Copy Report on Education, 1896–7.
1 Copy Maryland Reports, Vol. 86, 1897 to 1898.
1 Copy Electric Bureau Report, Philadelphia, 1897.
1 Copy Comptroller's Annual Report, Philadelphia, 1897.

1 Copy Annual Documents, 1897, Lynn., Mass.
1 Copy Ordinances, 1897, Worcester, Mass.
1 Copy Reports for 1897, Savannah, Ga.
1 Copy Reports for 1897, Indianapolis, Ind.
1 Copy Reports for 1896, Boston, Mass.
1 Copy "Inebriety," Cause, Prevention and Cure.
1 Copy Fourteenth United States Civil Service Report.
1 Copy Muncipal Reports for 1897, Omaha, Neb.
1 Copy Public Documents, for 1897, Newton, Mass.
1 Copy Ceremonies at Major General Smallwood's Monument.
1 Copy Commission of Labor's Twelfth Annual Report.
1 Copy United States Consular Reports, September, 1898.
1 Copy United States Consular Reports, October, 1898.
1 Copy Comptroller's Report, 1896–97, Allegheny, Pa.
1 Copy Sound Currency Compendium, 1896.
1 Copy Sound Currency Compendium, 1897.
1 Copy Department Reports, Milwaukee, Wis., 1896.
1 Copy Comptroller's Reports, 1896–7, Detroit, Mich.
1 Copy Auditor's Reports, 1896–7, Boston, Mass.
1 Copy Consular Reports, November, 1898.
1 Copy Report of Lake Mohonk Conference on International Arbitration.
1 Copy Smithsonian Report, 1895.
1 Copy Annual Reports, Cleveland, Ohio, 1897.
1 Copy Report of Baltimore Board of Trade,
1 Copy Bulletin of Department of Labor, July, 1898.
1 Copy Bulletin of Department of Labor, Sept., 1898.
1 Copy Annual Report of Department of Finance, Denver, Col.
2 Copies Forty-first Annual Statement of Finance, Chicago, Ill.
1 Copy Annual Report House of Reformation for Colored Boys, 1893.
1 Copy Annual Report House of Reformation for Colored Boys, 1895.
1 Copy Annual Report House of Reformation for Colored Boys, 1897.
1 Copy Comptroller's Report, 1897, New Orleans, La.
1 Copy Board of Police Annual Report, Boston, Mass.

1 Copy Report Special Committee on Relations Between Cities and Street Railways.

1 Copy Sixth Annual Report Maryland Bureau Industrial Statistics.

1 Copy Annual Report State Botanist, New York.

1 Copy Fifty-fifth Annual Report Mount Hope Retreat.

1 Copy Report of Boundary Line Between Allegany and Garrett Counties.

1 Copy Special Publication No. 2 on Ordinary Revenue, from Boston.

1 Copy Military Papers of Daniel D. Tompkins.

1 Copy Report of Fisheries, Game and Forest Commission of New York.

1 Copy Physiognomy, Illustrated: By Joseph Simms, M. D.

1 Copy Poe's Supplement to Public General Laws.

10 Vols. Century Encyclopedia and Dictionary.

1 Copy Annual Reports City of St. Paul, Minn.

1 Copy Municipal Register, Hartford, Conn.

1 Copy Mayor's Message, etc., City of St. Louis.

1 Copy Maryland Geological Survey, Vol. 2.

1 Copy Annual Reports City of Louisville, Ky,

1 Copy Auditor's Report City of Boston, Mass.

1 Copy Annual Reports City of Richmond, Va.

1 Copy Mayor's Message and Reports Chicago, Ill.

1 Copy Gloucester, Mass., City Documents.

1 Copy Salem, Mass., City Documents.

1 Copy History of Baltimore, Illustrated,

PUBLICATIONS DISTRIBUTED BY ORDER OF THE MAYOR DURING 1898.

20 Copies Report of Electrical Commission.

111 Copies Report of Sewerage Commission.

3 Copies Report Joint Special Committee on Sewerage, 1882.

1 Copy Acts of Maryland, 1876.

2 Copies History of City Hall.

1 Copy Public Local Laws.

3 Copies City Council Manual.

9 Copies City Charter.
1 Copy Financial Reports of 1897.
52 Copies City Code.
1 Copy Journal Proceedings First Branch City Council 1881–2.
1 Copy Journal Proceedings First Branch City Council 1889–90.
1 Copy Journal Proceedings Second Branch City Council 1889–90.
2 Copies Journal Proceedings First Branch City Council 1894-95.
2 Copies Journal Proceedings Second Branch City Council 1894–95.
1 Copy Journal Proceedings First Branch City Council 1895–96.
2 Copies Journal Proceedings Second Branch City Council 1895–96.
71 Copies Journal Proceedings First Branch City Council 1896-97.
56 Copies Journal Proceedings Second Branch City Council 1896–97.
2 Copies Mayor's Message and Annual Reports, 1895.
4 Copies Mayor's Message and Annual Reports, 1896.
40 Copies Mayor's Message and Annual Reports, 1897.
1 Copy Ordinances and Resolutions, 1860–61.
1 Copy Ordinances and Resolutions, 1879.
1 Copy Ordinances and Resolutions, 1882.
1 Copy Ordinances and Resolutions, 1883.
2 Copies Ordinances and Resolutions, 1890–91.
2 Copies Ordinances and Resolutions, 1891–92.
4 Copies Ordinances and Resolutions, 1892–93.
8 Copies Ordinances and Resolutions, 1893–94.
13 Copies Ordinances and Resolutions, 1894–95.
17 Copies Ordinances and Resolutions, 1895–96.
48 Copies Ordinances and Resolutions, 1896–97.

STATEMENT.

STATEMENT

Showing the Amounts Expended for the Various Departments for 1898.

Appeal Tax Court	$362 92
Bay View Asylum	145 57
City Attorney	7 75
City Collector	2,055 37
City Commissioner	486 00
City Comptroller	305 73
City Jail	263 78
City Register	291 38
City Library, (supplies account)	461 67
" " (telephone and advertising)	223 93
Commissioner Street Cleaning	132 48
Commissioners for Opening Streets	11 90
Examiner of Titles	16 40
Fire Department	416 97
General Superintendent Lamps	86 47
Harbor Board	54 32
Harbor Masters	61 17
Health Department	873 31
Inspector of Buildings	194 59
Inspector of Gas and Oils	6 11
Mayor's Office	250 45
Markets	20 83
Superintendent Public Buildings	45 46
Sewerage Commission	8 31
Topographical Survey	12 78
	$6,795 65
City Library, (salary account)	2,400 00
	$9,195 65
Amount of appropriation	$9,935 00
Less warrants issued	9,195 65
Balance	$739 35

The following departments, while ordering supplies, paid for them out of their own funds:

Chief Engineer Water Department	$2,002 69
Water Department	1,308 07
Electrical Commission	86 10
Topographical Survey	18 15

ANNUAL REPORT

—— OF THE ——

CITY COMMISSIONER

—— TO THE ——

Mayor and City Council of Baltimore,

—— FOR THE ——

FISCAL YEAR ENDING DECEMBER 31st, 1898.

REPORT.

CITY COMMISSIONER'S OFFICE,

BALTIMORE, January 1, 1899.

To the Honorable the Mayor and City Council of Baltimore:

GENTLEMEN: In making this annual report, owing to my short incumbency in the position of City Commissioner, I am forced to largely draw upon the recommendations of the Assistant City Commissioners, Messrs. Patterson, Connet and Brosius. At the same time, personal observation, even in this limited period, has given me an insight into the needs of the department, which I trust may not prove without value.

The condition of the older cobble-paved streets in Baltimore is disgraceful. Thousands of dollars have been expended in late years for repairs to such of these streets as seemed to need repairing most urgently, but thousands of dollars more would be needed to place them in even fair condition. The rough surface of cobble-paved streets holds dirt and filth, which no amount of cleaning will remove, leaving a deposit of decaying animal and vegetable matter, which is detrimental to health, as well as an eyesore to those traversing the street. It is to be hoped that at an early date such action will be taken by the Council as will prevent the further laying of cobble or rubble stone pavements in the city. While it is true that the original cost of cobble-paved streets is less than that of "improved" pavements, the fact that such work is guaranteed for but two years, as against five years' guarantee on improved pavements, will save three years' cost of repairs at the least.

In this connection I beg to call your attention to the great value of sheet-asphalt paving on a cobble-stone base. This class of paving obtains largely in New York City, Philadelphia, and Wash-

ington, and has given great satisfaction. It is more economical than any other form of sheet-asphalt paving, and is equally as satisfactory, and could be used in resurfacing many of the streets of Baltimore with great benefit, being cleanly, quiet, and a great saving to the owners of the many kinds of vehicles now using our rough streets. I am glad to know that there are now several ordinances pending before the Council for paving streets in this manner, and trust that the same may be passed, and the streets so paved.

It gives me pleasure to call your attention to the completion of the paving of Mount Royal avenue from Guilford avenue to Dolphin street, and of Fulton avenue from Presstman street to Pennsylvania avenue. The paving of these two avenues with smooth surfaces gives two handsome approaches to Druid Hill Park, and removes what was for a long time a nuisance to residents on the line of the streets, in the way of dust, mud, etc. The sheet-asphalt pavement on these streets is the cheapest ever laid in this city, being, respectively, $1.52 and $1.54 per square yard, laid on a six-inch concrete base. I beg to refer to the report of Assistant City Commissioner Connet for an itemized account of the work.

BRIDGES.

Many of the city bridges require prompt attention in order to prevent further damage by rust and scales on the iron bridges, and injury to the wooden bridges for lack of paint. In this connection, I again call your attention to the report of Assistant City Commissioner Connet, who has immediate charge of all of the city bridges.

SEWERS.

I beg to call your particular attention to the condition of Central avenue and Schroeder's Run sewers, as recited in the report of Mr. A. M. Brosius, Assistant City Commissioner, in charge of sewers. I cannot speak too strongly as to the necessity of the repairs needed, or the rebuilding of the first-named sewer. It is in such a condition that a serious accident to life and property is

liable to occur at any moment. The bottom of this sewer for about 460 feet north from the point where it connects with the Eden street sewer (at the intersection of Central avenue and East Lexington street), is laid with cobbles, which obstructs the flow of water and causes a deposit of sediment. An entire rebuilding is essential, and will become absolutely necessary at an early date. In only a less degree the same state of affairs exists as to Schroeder's Run sewer.

On December 31, 1898, there was a balance unappropriated of the Five and Six Million Loans, of $23,067.34, and amounts appropriated but not yet expended, of $64,449.97. A large number of improvements are suggested by Assistant City Commissioner Brosius, but owing to lack of funds to the credit of sewer construction, will undoubtedly have to lay over until a more convenient season.

REPAIRS OF STREETS.

A thorough inspection of the streets by Assistant City Commissioner Patterson was made in the early part of the year 1898, and the repair gangs were placed by him where, in his judgment, work of this character was most needed. With a mileage of nearly 400 miles of paved streets, many of which had not been repaired for years, it was a difficult matter to chose even those which most required the repairs. One hundred thousand dollars ($100,000) was appropriated by the Council for repairs of paved streets, and the amount expended during the year was $93,641.95, leaving a balance unexpended on December 31 of $6,358.05.

REPAVING OF STREETS BROKEN UP UNDER PERMITS.

The poor work done by many applicants for opening beds of streets to lay drain pipes, water-pipes, private sewers, etc., has rendered it necessary for the department to enforce the provisions of Section 108 of Article 48 of the City Code, from which I quote: "And any and all such other work as may be thereby necessary to restore the said street to a proper condition shall be done by the

City Commissioner, at the expense of said applicant; the paving to be done at the cost of paving or repaving to the city for the same kind of pavement." Acting under the provisions of this section I propose to have all repaving and repairing to the beds of public streets, lanes and alleys done under the supervision of this department, and to collect the cost from the individual or corporation who opened the bed of the street. In this way, and in this way only, in my opinion, can proper repairs be made to streets when torn up for laying water or gas pipes, sewers, etc.

GUARANTEE ON IMPROVED PAVEMENTS.

Since the year 1895 ordinances providing for paving streets with improved pavements have required a guarantee from the contractor to keep such pavements in good repair for five years from date of acceptance. In the cities of New York and Brooklyn such streets are guaranteed for ten, and even fifteen years; and while the original cost of the paving would undoubtedly be increased by the demand for a longer guaranty, I think it would be economy on the part of the city to secure the ten or fifteen-year clause in such contracts.

LIGHT STREET BRIDGE.

Noting in the public prints that it has been proposed to obtain an act for the removal of the Light Street Bridge, between the city and Anne Arundel county on the plea that it is an obstruction to the commerce of Baltimore, and a detriment to the interests of the water front on Spring Gardens, west of the bridge, I beg to refer you to the statement in Assistant Commissioner Connet's report, showing the amount of traffic over the bridge and the number of times it has been opened for the passage of vessels within the year just closed. The removal of the bridge would seriously affect the interests of the numerous market gardeners living in the county, and the citizens of Baltimore in retarding the receipt of fresh fruit and vegetables, and would prevent ready access to the cemeteries on the south side of the river, the lot holders of which are residents of Baltimore City. When it is understood that there were 309,149 vehicles passed over this bridge in the year 1898, it will show its great value as a connecting link between the city and county.

GRADES IN ANNEX.

The attention of your Honorable Body has already been called to the great necessity for some positive and regular system for the establishment of grades in the Annex. Within the past year many complaints have been received in this office concerning the arbitrary establishment of the grades of streets, many of which were public thoroughfares under the law of 1890 annexing the Belt to the city. Houses have been built on such streets and avenues without any regard to the rights of property holders on adjoining lots or those on the opposite sides of such streets or avenues. As a result, in some instances, the crown of the street is lower than the footway on one side and higher than that of the footway on the opposite side. This causes storm water to flow towards the lower side, in many cases flooding the property on that side and causing damage. I most respectfully suggest that an ordinance be introduced in the Council, and passed as promptly as possible, requiring all persons proposing to build on any street, lane or alley, public or private, in the Annex, to have the grade of such street, lane or alley established by this department before such buildings are commenced. In this way only can proper street lines be obtained, and the property of all those abutting on such streets be protected.

Special attention is called to the annexed tables, showing contracts in force in the City Commissioner's Department on December 31, 1898; the statement of amounts of money received for laying drain-pipes, sewer connections, sale of old material, etc. Several of the tabulated statements which have heretofore appeared in the City Commissioner's Report are in this report included in the report of Assistant City Commissioner Connet, who was Acting City Commissioner from October 22 to December 20, 1898, the date of my installation.

Respectfully submitted.

WILLIAM W. VARNEY,

City Commissioner.

During the year 1898 there was collected in this department as revenue from various sources $5,823.72. This comprises money received by the City Commissioner's Department for laying private drain-pipes, sales of old material, establishment of grades of streets, copying records, inspection of drain-pipes, labor performed for city departments, etc.

The collections by months (which amounts are returned each month to the Comptroller and go to the credit of the city treasury) are as follows:

January	$420 50
February	104 05
March	900 68
April	558 35
May	636 40
June	403 42
July	418 04
August	711 93
September	564 90
October	610 55
November	360 70
December	128 75
Total	$5,818 27

STATEMENT OF PERMITS ISSUED BY THE CITY COMMISSIONER'S DEPARTMENT DURING THE YEAR 1898.

The permits issued during the year number 1,915; an increase of 99 over that of 1897. Classified they are as follows:

To the Consolidated Gas Company	128
For water service pipes	519
For erecting, changing and renewing telegraph poles	20
" " " " " telephone poles	35
" " " " " electric line and lamp poles	99
" " " " " trolley poles	22
" " " " " guy posts or poles	15
For laying drain-pipes	294
For repairing drain-pipes	230
For setting and resetting kerb	49
For miscellaneous—repairs to streets, etc	60
For constructing driveways	24
For planting trees	15
For repairs of bridges	1
For laying subway conduits	14
For hauling cables	8
For erecting hitching posts	22
For blasting	18
For constructing street railway tracks	19
For placing gasoline tanks	9
For grading, paving and kerbing streets	15
For constructing footways	19
For grading streets	3
To the Water Department, for laying steam pipes	3
" " " waste water pipes	272
" " " placing stepping stones	2
	1,915

GENERAL INFORMATION.

THE TOTAL MILEAGE OF PAVED STREETS IN THE CITY OF BALTIMORE, DECEMBER 31, 1898, IS AS FOLLOWS:

Granite blocks	31.3005
Asphalt blocks	9.6969
Sheet asphalt	7.9897
Vitrified bricks	0.6415
Mosaic blocks	0.5220
Cobblestone, (Annex)	21.69
Cobblestone, (within old city limits)	301.25
Total mileage	373.0906

AREA OF THE CITY IS AS FOLLOWS:

Annex		23.059	square miles.
The old city, (land area)	13.202		
" " (harbor area)	1.507		
		14.709	" "
Total		37.768	" "

ABOVE MEAN LOW TIDE.

Highest elevation in the city near Garrison and Oakford avenues, West Arlington	461.0 feet.
Elevation of street pavement at foot of Washington Monument	99.3 "

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
262	George Klein.	Paving.	Hamburg street.	Grading, 20. cub. yd.; paving, setting flagstones, intervening blocks and gutter-stones, 5¾c. per sq. ft.; curbing, 37c. per lin. ft.; curb circles, 74c. lin. ft., resetting curb and circles, 10c. per lin. ft.; repaving, 3c. sq. ft.	Two years after work is accepted.
265	Patrick Keelty.	Paving.	Preston street.	Grading, 18c. cub. yd.; paving, setting flagstones, intervening blocks and gutter-stones, 7½c. sq. ft.; curbing, 39¾c. lin. ft.; curb circles, 79½c. lin. ft.; resetting curb and circles, 9½c. lin. ft.; repaving, 3½c. sq. ft.	April 10,1899.
271	M. F. Leonard.	Paving.	Andre street.	Grading, 14c. cub. yd.; paving, including gutter-stones, 7¼c. sq. ft.; curb and curb circles, 53c. lin. ft.; flagstone crossings and intervening blocks, 33c. sq. ft. Repaving, including gutter-stones, 3c. sq. ft.; resetting curb and circles, 8c. lin. ft.; relaying flagstones, 10c. sq. ft.; curb and curb circles, 68c. lin. ft.	Two years after acceptance of work.
273	M. F. Leonard.	Paving.	Beason street.	Grading, 14c. cub. yd.; paving, including gutter-stones, 7¼c. sq. ft.; repaving, including gutter-stones, 3c. sq. ft.; curb and curb circles, 68c. per lin. ft.; flags, including intervening blocks, 33c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; resetting flags and intervening blocks, 10c. sq. ft.; 4½-inch curb and circles, 35c. lineal ft.,	Two years after completion of work.

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
275	M. F. Leonard.	Paving.	Federal street.	Grading, 15c. cub. yd.; paving, including gutter-stones, 6¾c. sq. ft.; 4½-inch curbing and curb circles, 53c. lin. ft.; flag-stone crossings, including blocks, 33c. sq. ft.; repaving, including gutter-stones, 2¾c. sq. ft.; resetting curb and circles, 7c. lin. ft.; relaying flags and intervening blocks, 7c. sq. ft.; 5-inch curb and curb circles, 68c. lin. ft.	Jan. 12, 1899.
291	Westham Granite Co.	Paving.	York street.	Mosaic block paving, including gutter-stones; also including grading and removal of old cobble pavement, flag and gutter-stones and 4-inch curb-stones, and all sand and gravel required, $1.50 per sq. yd.; setting 6-inch curb, straight and curved, and rejointing when necessary, 10c. lin. ft.; old 6-inch curb, straight and curved, dressed, jointed and reset, 10c. lin. ft.; cobble repaving in cross streets, etc., 2½c. sq. ft.; resetting curb in cross streets, etc., 10c. lin. ft.	June 26, 1901.

294	Isaac S. Filbert.	Paving.	Mt. Royal avenue.	Granite block paving, including gutter-stones; also including grading and removal of old cobble pavement, flags, gutter-stones and 4-inch curbstones, including all sand and gravel required, $2.19 sq. yd.; resetting flags, 10c. sq. ft.; setting 6-inch curb, straight and curved, and rejointing when necessary, 15c. lin. ft.; cobble repaving in cross streets, including all sand and gravel required, 5c. sq. ft.; resetting curb in cross streets, including all sand and gravel required, 18c. lin. ft.; hauling curbstones, 7c. lin. ft.	Sept. 8, 1901.

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
295	I. S. Filbert.	Paving.	Aliceanna street.	Granite block paving, including gutterstones; also including grading and removal of old cobble pavement, flag and gutter-stones and 4-inch curbstones, and including all sand and gravel required, $1.93 sq. yd.; 6-inch curb, straight and curved, 15c. lin. ft.; old 6-inch curb, straight and curved, dressed, etc., 21c. lin. ft.; cobblestone repaving in cross streets, including all sand and gravel required, 4½c. sq. ft.; resetting curb in cross streets, including all sand and gravel required, 21c. per lin. ft.; hauling flagstones, cobble and gutter-stones, taken up, 12c. sq. yd.; hauling curbstones taken up, 6c. per lin. ft.	Oct. 26, 1901.
296	Southern Asphalt Paving Company.	Paving.	Broadway.	Sheet asphalt paving, including grading and removal of old cobble pavement, flagstones, gutter-stones, and 4-inch curbstones, $1.79 sq. yd.; setting 6-inch curb, straight and curved, and rejointing where necessary, 14c. lin. ft.; old 6-inch curb, straight and curved, dressed, rejointed and reset, 14c. lin. ft.; cobble repaving in cross streets, including necessary sand and gravel, 4c. per sq. ft.; resetting curb in cross streets, including necessary sand and gravel, 12c. lin. ft.; hauling cobble-stones, flagstones and gutter-stones taken up, 5c. per sq. yd. in place; hauling curbstones, 6c. per lin. ft.	Oct. 5, 1901.

299	Jones, Pollard & Co.	Paving.	Eutaw Place.	Asphalt block repaving, including necessary grading, preparation of foundation and removal of old blocks, $1.75 per sq. yd.; repairing with old blocks, including hauling same, preparation of foundation, etc., 50c. sq. yd.; resetting 6-inch curb where needed, 10c. lin. ft.	July 21, 1901.
300	The Maryland Pavement Company.	Paving.	McCulloh street.	Asphalt block paving, $2.02 sq. yd.; excavation, including removal of cobble-stones, curbstones, etc., 30c. cub. yd.; setting 6-inch curb, straight and curved, 8c. lin. ft.; old 6-inch curb, redressed, rejointed and reset, 10c. lin. ft.; cobble repaving in cross streets, 2¼c. sq. ft.; resetting old curb in cross streets, 6c. lin. ft.; Belgian block repaving, 1½c. sq. ft.	Dec. 29, 1901.
304	Jones, Pollard & Co.	Paving.	Pearl street.	Asphalt block paving, including grading and removal of old cobble pavement, flags, gutter-stones and 4-inch curbs and preparation of foundation, $2.11 per sq. yd.; setting 6-inch curb, straight and curved, (furnished by city,) 10c. lin. ft.; old 6-inch curb, straight and curved, redressed, rejointed and reset, 15c. lin. ft.; cobble repaving in cross streets, 4c. sq. ft.; resetting old curb in cross streets, 8c. lin. ft.	Oct. 9, 1901.

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Price.	Expires, (Including Guaranties).
305	Jones, Pollard & Co.	Paving.	Fulton avenue.	Asphalt block paving, including taking up present pavement, assorting blocks, grading, preparation of foundation, etc., $2.1795 per sq. yd.; repairing with old blocks removed from streets, including hauling; also preparation of foundation, hauling discarded blocks, etc., 50c. sq. yd.; repaving Belgian block intersections, 20c. sq. yd.; resetting curb, 10c. lin. ft.	Dec. 3, 1901.
306	Jones, Pollard & Co.	Paving.	Mt. Royal avenue.	Asphalt block paving, including removal old cobble pavement, flags, gutter-stones and 4-inch curbstones, and including foundation, $2.0643 per sq. yd.; setting 6-inch curb (furnished by city), 10c. lin. ft.; old 6-inch curb, straight and curved, redressed, rejointed and reset, 15c. lin. ft.; old flags taken up and hauled to Patapsco and Luzerne streets, 6c. sq. ft.; old 4-inch curb to be taken up and hauled as above, 7c. lin. ft.; cobble repaving in cross streets, including necessary sand and gravel, 4c. sq. ft.; resetting curb in cross streets, including necessary sand and gravel, 8c. lin. ft.	Oct. 26, 1901.

309	J. P. McGovern.	Paving.	Baker street.	Grading, 10c. cub. yd.; cobble paving, including gutter-stones, 6c. sq. ft.; 5-inch curb and curb circles, 70c. lin. ft.; 4½-inch curb and curb circles, 40c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; repaving, including gutter-stones, etc., 2c. sq. ft.; resetting curbs and circles, 5c. lin. ft.; relaying flagstones, 6c. sq.ft.	July 3, 1899.
310	P. Reddington.	Paving.	Bayard street.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 6½c. sq. ft.; 5-inch curb and circles, 60c. lin. ft.; flagstone crossings, including Belgian blocks, 34c. sq. ft.; cobble repaving, including gutter-stones, etc., 3c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flagstones, 6c. sq. ft.; 4½-inch curb and circles, 50c. lin. ft.	June 15, 1899.
311	P. Reddington.	Paving.	Marshall street.	Grading, 20c. cub. yd.; cobble paving, including gutter-stones, 7½c. sq. ft. 5-inch curbs and circles, 60c. lin. ft.; 4½-inch curbs and circles, 50c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; cobble repaving, including gutter-stones, etc., 3c. sq. ft.; resetting curbs and circles, 8c. lin ft.	April 5, 1899.

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Price.	Expires, (Including Guaranties).
312	P. Reddington.	Paving.	Bruce alley.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 8c. sq. ft.; 5-inch curb and circles, 60c. lin. ft.; 4½-inch curb and circles, 40c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; cobble repaving, including gutter-stones, etc., 3c. sq. ft.; resetting curb and circles, 8c. lin. ft.; relaying flagstones, 6c. sq. ft.	Sept. 11, 1899.
313	F. Keelty.	Paving.	Lawrence street.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 6⅞c. sq. ft.; 5-inch curbstones and circles, 65c. lin. ft.; 4½-inch curbstones and circles, 45c. lin. ft.; flagstone crossings, including blocks, 33c. sq. ft.; cobble repaving, including gutter-stones, etc., 3c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flagstone crossings, 2c. sq. ft.	July 20, 1899.
314	P. Keelty.	Paving.	Covington street.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 6½c. sq. ft.; 5-inch curbstones and circles, 65c. lin. ft.; 4½-inch curbs and circles, 50c. lin. ft.; flagstone crossings, including Belgian blocks, 33c. sq. ft.; cobble repaving, including gutter-stones, etc., 2½c. sq. ft.; resetting curbs and circles, 6c. lin. ft.; relaying flagstones, 3c. sq. ft.	June 17, 1899.

329	F. E. Yewell.	Paving.	Portions of St. Paul, 28th, 29th and Calvert streets.	Maintenance of street guaranteed.	Two years after completion of work.
333	James P. McGovern.	Paving.	Madison street.	Private contract. St. repairs guarant'd.	May 3, 1899.
335	M. F. Leonard.	Paving.	North avenue.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 5¼c. sq. ft.; 5-inch curbs and circles, 65c. lin. ft.; 4½-inch curb and circles, 47c. lin. ft.; flagstone crossings, including blocks, 32c. sq. ft.; cobble repaving, excluding gutter-stones, etc., 3¼c. sq. ft.; resetting curbs and circles, 7c. lin. ft.; relaying flagstone crossings, 4c. sq. ft.; for new gutter-stones, 24c. lin. ft.	Two years after work is accepted.
336	M. F. Leonard.	Paving.	Luzerne street.	Grading, 10c. cub. yd.; cobble paving, including gutter-stones, 6½c. sq. ft.; 5-inch curbstones and circles, 65c. lin. ft.; 4½-inch curbstones and circles, 53c. lin. ft.; flagstone crossings, including blocks, 32c. sq. ft.; repaving, including gutter-stones, etc., 3c. sq. ft.; resetting curbs and circles, 7c. lin. ft.; relaying flagstone crossings, 4c. sq. ft.	Aug. 5, 1899.
340	J. P. McGovern.	Paving.	Lanvale street.	For grading, 10c. cub. yd.; cobble paving, 6c. sq. ft.; 4½-inch curb, 48c. lin. ft.; flags and Belgian blocks, 34c. sq. ft.; repaving, 2¾c. sq. ft.; resetting curb, 8c. lin. ft.; resetting flags, 2¾c. sq. ft.	Nov. 20, 1899.

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
341	J. P. McGovern.	Paving.	Mount street.	Grading, 10c. cub. yd.; new cobble paving, 5¾c. sq. ft.; 4½-inch curb, 48c. lin. ft.; flags and Belgian blocks, 33c. sq. ft.; repaving, 2¾c. sq. ft.; resetting curb, 6c. lin. ft.; resetting flags, 2c. sq. ft.	Sept. 11, 1899.
342	J. P. McGovern.	Paving.	Northwest street.	Grading, 9c. cub. yd.; cobble paving, 5¾c. sq. ft.; 4½-inch curb, 48c. lin. ft.; flags and Belgian blocks, 33c. sq. ft.; repaving, 2c. sq. ft.; resetting curb, 5c. lin. ft.; resetting flags, 2c. sq. ft.	Dec. 3, 1899.
343	J. P. McGovern.	Paving.	Carey street.	Grading, 12c. cub. yd.; new cobble paving, 5¾c. sq. ft.; 4½-inch curb, 48c. lin. ft.; flags and Belgian blocks, 33c. sq. ft.; repaving, 2½c. sq. ft.; resetting curb, 5c. lin. ft.; resetting flags, 2c. sq. ft.	Two years after work is accepted.
348	P. Reddington.	Paving.	Ridgely street.	For grading, 12c. cub. yd.; cobble paving, including gutter-stones, 7c. sq. ft.; 4½-inch curbstones, 47c. lin. ft.; for flagstone crossings, including Belgian blocks, 32c. sq. ft.; repaving, including gutter-stones, and furnishing all material required to pave area of pavement removed, 3c. sq. ft.; resetting curbstones and circles, 8c. lin. ft.; relaying flagstones and intervening blocks, 6c. sq. ft.	Dec. 7, 1899.

354	H. T. Campbell.	Paving.	Townsend street.	Private contract. Street repairs guaranteed.	June 16, 1899.
355	Pat. Keelty.	Paving.	Register street.	Private contract. Street repairs guaranteed.	April 9, 1899.
357	M. F. Leonard.	Paving.	Alley between 8th and 9th streets; Northwest street and North avenue.	Grading, 23c. cub. yd.; cobble paving, 8½c. sq. ft.; 5-inch curb and circles, 58c. lin. ft.; 4½-inch curb and circles, 48c. lin. ft.; flagstone crossings, including blocks, 35c. sq. ft.; resetting curbstones and circles, 10c. lin. ft.; relaying flagstone crossings, including blocks, 5c. sq. ft.	Two years after acceptance of work
358	H. T. Campbell.	Paving.	Register street and Hopkins avenue.	Private contract. Street repairs guaranteed.	June 17, 1899.
360	D. M. Newbold.	Paving, etc.	Maryland avenue.	Private contract. Street repairs guaranteed.	June 16, 1899.
362	J. G. Schwind.	Stone.	Stricker street sewer.	Rubble masonry stone, $1.28½ per cub. yd. in place.	Complet'n of work.
363	B. Wallis & Co.	Brick and Cement.	Stricker street sewer.	Vitrified rectangular bricks, $17.00 per thousand; vitrified radial bricks, $18.50 per thousand; Cumberland cement in bags, $1.05 per bbl., with refund of 10c. for each bag returned; Cumberland cement in bbls., $1.20 per bbl., with refund of 5c. for each bbl. returned.	Complet'n of work.
364	Robt. J. Cremen.	Setting Curb.	Presbury and Monroe streets.	Private contract. Maintenance of curb guaranteed.	June 4, 1899.
365	National Building Supply Co.	Cement.	Stricker street sewer.	Porta brand German Portland cement, $2.35 per bbl.; delivered on line of work, with refund of 10c. for each bbl. returned.	Complet'n of work.

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
367	Jas. R. Busey & Son.	Bricks.	Stricker street sewer.	Hand-made bricks, $6.94 per thousand; machine-made bricks, $5.70 per thousand.	Complet'n of work.
368	John Muller.	Curbing.	Durham street.	Private contract. Maintenance of work guaranteed.	June 12, 1899.
369	D. M. Larkin.	Sand.	Stricker street sewer.	Seventy cents (70c.) per cubic yard.	Complet'n of work.
370	P. Reddington.	Paving.	Madison street.	Grading, 10c. cub. yd.; cobble paving, 6½c. sq. ft.; 5-inch curbstones and circles, 60c. lin. ft.; 4½-inch curb and circles, 50c. lin. ft.; flagstone crossings, including intervening blocks, 34c. sq. ft.; cobble repaving, including necessary material required, 4c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flagstone crossings, including blocks, 6c. sq. ft.	Two years after acceptance of work.
372	P. Reddington.	Paving.	Alley between McKim and Hillman streets.	Grading, 20c. cub. yd.; cobble paving, 7c. sq. ft.; 5-inch curbs and circles, 60c. lin. ft.; 4½-inch curbs and circles, 50c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; cobble repaving, including necessary material required, 4c. sq. ft.; resetting curbs and circles, 7c. lin. ft.; relaying flagstone crossings, 6c. sq. ft.	Two years after work is accepted.
375	J. P. McGovern.	Paving.	Calhoun street.	Grading, 14½c. cub. yd.; cobble paving, 5¾c. sq. ft.; 4½-inch curb, 48c. lin. ft.; flags and Belgian blocks, 33c. sq. ft.; repaving, 2½c. sq. ft.; resetting curb, 5c. lin. ft.; resetting flags, 2½c. sq. ft.	Two years after work is accepted.

377	The Maryland Pavement Co.	Paving.	Patterson avenue.	For asphalt block paving, including grading and taking up of the old cobblestone pavement, flagstones, gutter-stones, and 4½-inch curbstones, also furnishing concrete base, sand and rolling as per specifications, $2.25 per sq. yd.; for new 4½-inch curb, set, 65c. lin. ft.; new 4½-inch curb circles, set, $1.30 lin. ft. old 4½-inch curb and circles, dressed, rejointed and reset, 30c. lin. ft.; new 6-inch curb, 89c lin ft.; new 6-inch circles, $1.47 per lin. ft.; old 6-inch curb and circles, dressed, jointed and reset, 30c. lin. ft.; resetting curb and circles, 15c. lin. ft.; new 10-inch gutter-stones, including concrete base, 35c. lin. ft.; cobblestone repaving in cross streets, 5c. sq. ft.	Nov. 17, 1902.	
378	J. P. McGovern.	Paving.	Mulberry street.	For grading, 15c. cub. yd.; cobble paving, 6½c. sq. ft.; 4½-inch curb and circles, 52c. lin. ft.; flagstone crossings, including blocks, 32c. sq. ft.; repaving, including all material required, 3½c. sq. ft.; resetting curbs and circles, 8c. lin. ft.	Two years after work is accepted.	
380	Jos. Hampson, Jr.	Curbing.	Vincent alley.	Private contract. Maintenance of work guaranteed.	Dec. 17, 1899.	

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
381	P. Reddington.	Paving.	Twenty-third street.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 6½c. sq. ft.; 5-inch curbstones and circles, 60c. lin. ft.; 4½-inch curbstone and circles, 50c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; cobble repaving, including gutter-stones and furnishing all material required, etc., 3¾c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flagstone crossings, 6c. sq. ft.	Two years after acceptance of work.
382	P. Reddington.	Paving.	Castle street.	Grading, 12c. cub. yd.; cobble paving, including gutter-stones, 6½c. sq. ft.; 5-inch curbs and circles, 60c. lin. ft.; 4½-inch curbs and circles, 50c. lin. ft.; flagstone crossings, including blocks, 24c. sq. ft.; cobble repaving, including gutter-stones, and furnishing all material required, etc., 3½c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flagstone crossings, 6c. sq. ft.	Two years after acceptance of work.
383	Wm. Collett & Co.	Paving.	Fulton avenue.	Private contract. Maintenance of work guaranteed.	Dec. 22, 1899.
384	Jas. P. McGovern.	Removing curb.	North and Fulton avenues.	Private contract. Maintenance of work guaranteed.	Oct. 5, 1899.
385	Wm. Collett & Co.	Curbing.	Fulton avenue.	Private contract. Maintenance of work guaranteed.	July 21, 1899.

387	P. Reddington.	Paving.	Little Forrest street.	Grading, 20c. cub. yd.; cobble paving, 7c. sq. ft.; 5-inch curbs and circles, 60c. lin. ft.; 4½-inch curbs and circles, 50c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; cobble repaving, including gutter-stones, and all material required, etc., 3½c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flagstone crossings, 6c. sq. ft.; repaving granite block pavement, 4½c. sq. ft.	Sept. 1, 1899.
388	E. J. Storck.	Setting curb.	Townsend street.	Private contract. Maintenance of work guaranteed.	Aug. 16, 1899.
389	C. E. Spalding.	Paving.	Alleys.	Private contract. Maintenance of work guaranteed.	Sept. 11, 1899.
390	John Muller.	Paving.	Townsend street and Hopkins avenue.	Private contract. Maintenance of work guaranteed.	Oct. 10, 1899.
391	J. P. McGovern.	Paving.	Scott street.	Grading, 10c. cub. yd.; cobble paving, including gutter-stones, 6¼c. sq. ft.; 5-inch curbs and circles, 60c. lin. ft.; 4½-inch curbs and circles, 50c. lin. ft.; flagstone crossings, including gutter-stones and furnishing all material required, etc., 3c. sq. ft.; relaying flagstone crossings, 5c. sq. ft.	Two years after work is accepted.
393	E. S. Hampson.	Paving.	St. Paul street.	Private contract. Street repairs guaranteed.	

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
394	P. Reddington.	Paving.	Girard avenue.	Grading, 10c. cub. yd.; new cobble paving, including gutter-stones, 6½c. sq. ft.; 5-inch curbstones and circles, 60c. lin. ft.; 4½-inch curbstones and circles, 50c. lin. ft.; flagstone crossings, including intervening blocks, 32c. sq. ft.; cobble repaving, including gutter-stones and furnishing all material required, etc., 3c. sq. ft.; resetting 4½-inch curbs and circles, 7c. lin. ft.; resetting 6-inch curbs and circles, 8c. lin. ft.; relaying flagstone crossings, 4c. sq. ft.	Two years after work is accepted.
395	P. Reddington.	Paving.	Pulaski street.	Grading, 12½c. cub. yd.; cobble paving, 6c. sq. ft.; 5-inch curbstones and circles, 60c. lin. ft.; 4½-inch curbstones and circles, 50c. lin. ft.; flagstone crossings, including blocks, 32c. sq. ft.; cobble repaving, including gutter-stones and all material required, etc., 3c. sq. ft.; resetting curbstones and circles, 7c. lin. ft.; relaying flagstone crossings, 4c. sq. ft.	Two years after work is accepted.

396	P. Reddington.	Paving.	Payson street.	Grading, 12½c. cub. yd.; cobble paving, including gutter-stones, 6c. sq. ft.; 5-inch curbstones and circles, 60c. lin. ft.; 4½-inch curbs and circles, 50c. lin. ft.; flagstone crossings, including blocks, 32c. sq. ft.; cobble repaving, including gutter-stones and furnishing all material required, etc., 3½c. sq. ft.; resetting curbs and circles, 7c. lin. ft.; relaying flagstone crossings, 4c. sq. ft.	Two years after work is accepted.
397	J. P. McGovern.	Paving.	Twenty-first street.	Grading, 18c. cub. yd.; cobble paving, 7c. sq. ft.; 4½-inch curbstones and circles, 50c. lin. ft.; cobble repaving, including gutter-stones and all material required, etc., 3c. sq. ft.; flagstone crossings, including blocks, 32c. sq. ft.; resetting curbstones and circles, 8c. lin. ft.; relaying flagstone crossings, 4c. sq. ft.	Sept. 30, 1899.
398	B. Wallis & Co.	Cement.	Clifton ave. sewer.	Saylor's Portland Cement, $2.25 per bbl.; Alpha Portland Cement, $2.25 per bbl.; Vulcanite Portland Cement, $2.25 per bbl.; Germania Portland Cement, $2.60 per bbl.; Burnham Portland Cement, $2.34 per bbl.	Completion of work.
399	National Building Supply Company.	Cement.	Clifton ave. sewer.	Cumberland and Potomac Cement and National Cement, 51½c. per bag; Porta Portland Cement, $2.35 per bbl., with refund of 10c. for each bag or bbl. returned in good order.	Completion of work.
400	Smith & Schwarz Brick Company.	Bricks.	Clifton ave. sewer.	Hand-made bricks, $6.90 per thousand.	Completion of work.

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	For	Expires, (Including Guaranties).
401	J. N. Dubarry, Jr., & Co.	Bricks & Cement.	Clifton ave. sewer.	Vitrified bricks for inverts, $18.25 per thousand; Union Brand Cement, in bags, 47c. per bag; Union Brand Cement, in barrels, $1.14 per bbl., with refund of 5c. for each bag and 10c. for each barrel returned in good order.	Completion of work.
402	P. Reddington.	Paving.	Kirby's lane.	Grading, 15 cub. yd.; cobble paving, including gutter-stones, 6c. sq. ft.; 5-inch curbstones and circles, 60c. lin. ft.; 4½-inch curbstones and circles, 50c. lin. ft.; flagstone crossings, including blocks, 32c. sq. ft.; cobble repaving, including gutter-stones, and furnishing all material required, etc., 3c. sq. ft.; resetting curbstones and circles, 8c. lin. ft.; relaying flagstone crossings, 6c. sq. ft.	Two years after work is accepted.
403	P. Reddington.	Paving.	Richardson street.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 7c. sq. ft.; 5-inch curbs and circles, 60c. lin. ft.; 4½-inch curb and circles, 50c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; cobble repaving, including gutter-stones and all material required, etc., 3c. sq. ft.; for resetting curbstones and circles, 8c. lin. ft.; relaying flagstone crossings, 6c. sq. ft.	Two years after work is accepted.

405	J. P. McGovern.	Paving.	Durham street.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 7c. sq. ft.; 5-inch curbstones and circles, 70c. lin. ft.; 4½-inch curbstones and circles, 50c. lin ft.: flagstone crossings, including blocks, 32c. sq. ft.; repaving cobble pavement, including gutter-stones and furnishing all material required, etc., 3½c. sq. ft.; resetting curbs and circles, 10c. lin. ft.; relaying flagstone crossings, 6c. sq. ft.	Two years after work is accepted.
406	P. Reddington.	Paving.	Alley rear north side of Falls road.	Grading, 20c cub. yd.; cobble paving, 8c. sq. ft.; 4½-inch curb and circles, 50c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; repaving cobble pavement, including gutter-stones and all material necessary, etc., 3c. sq. ft.; resetting curbs and circles, 7c. lin. ft.; relaying flagstone crossings, 6c. sq. ft.	Two years after work is accepted.
407	Jas. R. Busey & Son.	Brick.	Clifton avenue sewer.	Machine-made brick for interior work, $6.70 per thousand; machine-made brick for backing, $6.10 per thousand.	Completion of work.
408	D. A. Leonard.	Stone.	Clifton avenue sewer.	Stone delivered and accepted, $1.34 cub. yd.	Completion of work.
409	P. Reddington.	Paving.	23½ street.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 7½c. sq. ft.; 5-inch curbs and circles, 60c. lin. ft.; 4½-inch curbs and circles, 50c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; for cobble repaving, including gutter-stones and other necessary material, 3c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flagstone crossings, 6c. sq. ft.	Oct. 9, 1899.

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
410	Frank Slingluff.	Grade and Macadamize.	Clifton avenue.	Street repairs guaranteed for two years.	Nov. 15, 1899.
411	B. F. Knight.	Paving.	Francis street.	Private contract. Street repairs guaranteed.	Oct. 2, 1899.
413	P. Reddington.	Paving.	Alley rear of O'Donnell street.	Grading, 15c. cub. yd.; cobble paving, including gutter-stones, 7½c. sq. ft.; 5-inch curb and circles, 60c. lin. ft.; 4½-inch curb and circles, 55c. lin. ft.; flagstone crossings, including blocks, 34c. sq. ft.; cobble repaving, including gutter-stones and other material required, 3c. sq. ft.; resetting curbs and circles, 10c. lin. ft.; relaying flagstone-crossings, 6c. sq. ft.	Nov. 15, 1899.
415	John Muller.	Paving.	Hopkins avenue.	Private contract. Street repairs guaranteed.	Nov. 22, 1899.
416	P. Reddington.	Paving.	Druid Hill avenue.	Grading, 20c. cub. yd.; cobble paving, 7½c. sq. ft.; 5-inch curbstones and circles, 60c. lin. ft.; 4½-inch curbstones and circles, 50c. lin. ft.; flagstones, 34c. sq. ft.; cobble repaving, 3c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flagstones, 6c. sq. ft.	Two years after acceptance of work.

417	J. P. McGovern.	Paving.	Marshall street.	Grading, 25c. cub. yd.; cobble paving, 7½c. sq. ft.; 5-inch curbs and circles, 60c. lin. ft.; 4½-inch curbs and circles, 50c. lin. ft.; flagstones, 32c. sq. ft.; cobble repaving, 3½c. sq. ft.; resetting curbs and circles, 10c. lin. ft.	Two years after acceptance of work.
418	M. F. Leonard.	Paving.	Collington avenue.	Grading, 10c. cub. yd.; cobble paving, 6c. sq. ft.; 5-inch curbs and circles, 59c. lin. ft.; 4½-inch curbs and circles, 49c. lin. ft.; flagstones, 32c. sq. ft.; cobble repaving, 3c. sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flags, 4c. sq. ft.	Two years after acceptance of work.
419	J. P. McGovern.	Paving.	Friendsbury Place.	Private contract. Maintenance of paving guaranteed.	Two years after work is accepted.
420	Harrison Building Association.	Paving.	Bethel street.	Private contract. Maintenance of paving guaranteed.	Two years after work is accepted.
421	Randolph Forrester.	Setting curb.	North avenue.	Private contract. Maintenance of curb guaranteed.	Dec. 6, 1899.
422	Jacob Saum.	Setting curb.	Fulton avenue.	Private contract. Maintenance of curb guaranteed.	Dec. 11, 1899.
423	R. B. Tippett.	Grading.	Thirteenth street.		Two years after work is accepted.
425	J. P. McGovern.	Paving.	Mosher street.	Private contract. Maintenance of paving guaranteed.	

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties.)
426	J. P. McGovern.	Paving.	Twenty-first street.	Grading, 17c. cub. yd.; cobble pavement, 6½c. sq. ft.; 5-inch curbstones and circles, 60c. lin. ft.; 4½-inch curbstones and circles, 50c. lin. ft.; flagstone crossings, including blocks, 32c. sq. ft.; cobble repaving, including gutterstones, etc., 3c. sq. ft.; resetting curbs and circles, 10c. lin. ft.; relaying flagstone crossings, 4c. sq. ft.	Two years after work is accepted.
428	W. J. Armiger.	Curbing.	Waverly avenue.	Private contract.	Jan. 29, 1900.
429	McCormick & Co.	Gasoline tank.	Balderston street.	" "	Perpetual.
430	Jas. P. McGovern.	Paving.	Brice alley.	" "	1900.
432	Thos. F. Locke.	"	Stockholm street.	" "	Feb. 11, 1900.
434	Thos. F. Locke.	"	Riggs avenue.	" "	Mch. 21, 1900.
435	Jas. P. McGovern.	"	Payson street.	" "	June 14, 1900.
436	P. Reddington.	"	Mosher street.	" "	Contract void
437	M. F. Leonard.	"	Fairmount avenue.	" "	Apr. 9, 1900.
440	Thos. F. Locke.	"	Riggs avenue.	" "	Apr. 10, 1900.
441	Chas. A. Hook.	Rental of stone-crusher.	.....	$50 for first year.	Renewable yearly.
443	I. S. Filbert.	Paving.	Linden avenue.	Private contract.	May 1, 1898.
444	F. G. Duhurst.	Sand.	Brice alley sewer.	64c. per cubic yard.	Complet'n wk
445	W. D. Gill & Son.	Lumber.	General uses.	{ $18.95 per 1,000 feet for Georgia pine. } { $10.50 " " " " N. C. " }	Dec. 31, 1898.

446	Geo. Utterbaugh.	Paving.	Addison alley.	Private contract.	May 20, 1900.
447	I. S. Filbert.	Bricks, (Vit).	Brice alley sewer.	$17.48 per 1,000.	Completion of work.
448	Jas. R. Busey.	H. M. Bk's M. M. Bk's	" " " " " "	$6.45 " " $9.95 " "	Completion of work.
449	I. H. Peddicord.	Cobble-stones.	Third District.	$1.50 per perch.	Dec. 31, 1898.
450	Jas. H. Atkinson.	Flagstones and Belgian blks	General uses.	26c. per square foot.	Dec. 31, 1898.
451	Geo. W. Howser.	Sand.	Districts 2, 3 and 4.	55c. per cubic yard.	Dec. 31, 1898.
452	R.C.Michael & Sons.	Sand.	First and Fifth Districts.	First District, 55c. per cubic yard. Fifth District, 50c. cubic yard.	Dec. 31, 1898.
453	Ed. J. Gallagher.	Paving.	Fairmount avenue.	Private contract.	June 4, 1900.
454	D. A. Leonard.	Cobble-stone.	Fifth District.	$1.75 per perch delivered.	Dec. 31, 1898.
457	Hanline Bros.	Paints, etc.	General uses.	1½-in. fitches, $1.40 per dozen. Prince's Met. brown paint, 1c. per lb.	Dec. 31, 1898.
458	M. F. Leonard.	Paving.	Henry street.	Grading, 23c. per cub. yd.; 5-in. curbs and circles, 63c. lin. ft.; new cobble pavement, including gutter-stones, 8c. per sq. ft.; 4½-in. curbstones and circles, 50c. per lin. ft.; flagstone crossings, 32c. sq. ft.; cobble repaving, including gutter-stones, 3½c. per sq. ft.; resetting curbs and circles, 8c. lin. ft.; relaying flagstone crossings, 4c. sq. ft.	Two years after completion of work.
460	Maryland Cement Co.	Cement.	Brice alley sewer and general purposes.	Patapsco cement in bags, 65½c. per bag; Patapsco cement in bbls., $1.51 per bbl.; Toltec cement in bbls., $2.10 per bbl., with refund of 5c. for each empty bbl., and 7½c. for each empty bag returned.	Completion of work.

CONTRACTS IN FORCE, ETC.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
461	National Building Supply Co.	Cement.	Brice alley sewer.	Cumberland & Potomac brand, natural domestic cement, 49½c. per bag; Kaiser brand, foreign Portland, $2.45 per bbl.; Porta brand, foreign Portland, $2.50 per bbl., with refund of 10c. for each bag or barrel returned in good order.	Completion of work.
462	George M. Hay.	Cement.	Brice alley sewer and general purposes.	For sewer work—Union brand Cement in bbls., $1.14 per bbl., with refund of 10c. per bbl. returned in good order.	Completion of work.
				For general purposes—Union brand cement, 51¾c. per bag, and $1.14 per bbl., with refund of 10c. for each empty bag or bbl. returned in good order.	Dec. 31, 1898.
463	J. Merrick Horn.	Curb circles.	General purposes.	65c. per lineal foot.	Dec. 31, 1898.
465	B. Wallis & Co.	Cement.	General purposes.	Olsen brand, foreign Portland cement, $2.65 per bbl.; Hemmoor brand, foreign Portland cement, $2.25 per bbl.; Germania brand, foreign Portland cement, $2.65 per bbl.; Schiffendecker brand, foreign Portland, $2.55 per bbl., with refund of 10c. for each bbl. returned in good order.	Dec. 31, 1898.

466	John T. Curley & Co.	Curb-stones, etc	General purposes.	....	.....
468	Maryland Pavement Company.	Repaving.	Grant street.	Lump sum of $650.	Aug. 1, 1903.
469	Chesapeake & Potomac Telephone Co.	Tele-phones.	Service.	$36 per annum.	Pleasure of Commis'nr.
471	Southern Asphalt Paving Co.	Paving.	Fulton avenue.	Sheet asphalt paving, including all necessary grading, a 6-inch concrete base, 1½-inch binder and 2-inch wearing surface, $1.54 per sq. yd.; new 6-inch curb, including circles, set, 95c. per lin. ft.; new 5-inch curb, including circles, set, 95c. per lin. ft.; old 6-inch curb and circles, redressed and reset, 13c. per lin. ft.; old 5-inch curb, including circles, redressed and reset, 14c. per lin. ft.; old 5 and 6-inch curb, redressed in place, 13c. per lin. ft.; resetting old curb in cross streets, 12c. per lin. ft.; 4½-inch headers for sheet asphalt paving, 65c. per lin. ft.; 3-foot open-stone gutters, $3.40 per lin. ft.; brick gutters and brick paving for sheet asphalt, 27c. per sq. ft.; cobble paving, 6c. per sq. ft.; cobble repaving, 3½c. per sq. ft.; hauling old cobble-stone, unused, per cub. yd. per mile, 35c.; hauling old curb, unused, per lin. ft. per mile, 7c.; hauling old flagstone, unused, per sq. ft. per mile, 4c.	Dec. 24, 1903.

CONTRACTS IN FORCE, Etc.—Continued.

No.	Contractor.	To Furnish	For	Prices.	Expires, (Including Guaranties).
472	Southern Asphalt Paving Co.	Paving.	Mt. Royal avenue.	For sheet asphalt paving, including all necessary grading, 6-inch concrete base, 1½-inch binder and 2 inches wearing surface, $1.52 per sq. yd.; Belgian block paving, including all necessary grading, 6-inch concrete base and 2 inches of sand, 10-inch gutter-stones and pouring joints with asphalt cement, $2.60 per sq. yd.; new 6-inch curb, including circles, set in place, 70c. per lin. ft.; old 6-inch curb and circles, redressed and reset, 13c. per lin. ft.; old 6-inch curb, redressed in place, 13c. per lin. ft.; resetting and rejointing old curb in cross streets, 12c. per lin. ft.; 4½-inch headers set, 60c. per lin. ft.; 3-foot open stone gutters, $3.30 per lin. ft.; vitrified brick gutters and paving, 23c. per sq. ft.; cobble paving, 6c. per sq. ft.; cobble repaving, 3c. per sq. ft.; hauling old cobblestones, unused, per cub. yd. per mile, 30c.; hauling old curbstones, unused, per lin. ft. per mile, 6c.; hauling old flagstones, unused, per sq. ft. per mile, 4c.	.....
473	David M. Newbold.	Pave a strip.	Baltimore street and Fairmount avenue.	Private contract. Two years guarantee.	July 15, 1900.

474	F. G. Duhurst.	Stone.	Brice alley sewer.	$1.85 per cub. yd.	Completion of work.
475	B. Wallis & Co.	Vitrified bricks.	Harris Creek sewer.	$19.00 per thousand.	Completion of work.
476	National Building Supply Co.	Cement.	Harris Creek sewer.	$1.85 per bbl., with refund for bbls. returned in good order of 5c. each.	.....
478	I. H. & H. E. Peddicord	Stone.	Harris Creek sewer.	$1.60 per cub. yd., measured in place.	Completion of work.
479	Benjamin Noha.	Sand.	Harris Creek sewer.	65c. per cub. yd., delivered.	Completion of work.
480	J. R. Busey & Son.	Machine-made b'ks	Harris Creek sewer.	$6.90 per thousand.	Completion of work.
481	Smith & Schwarz Brick Co.	Hand-made b'ks	Harris Creek sewer.	$6.22 per thousand.	Completion of work.
484	Wm. E. Anderson.	Paving and curbing.	Rose street.	Private contract.	Two years after acceptance of work
485	D. A. Leonard.	Paving.	Irving avenue.	Private contract.	Two years after acceptance of work
486	E. J. Gallagher.	Paving.	Chesapeake street, etc.	Private contract.	Two years after acceptance of work
487	F. G. Duhurst.	Covering up.	Brice alley sewer.	12c. per cub. yd., measured in place.	Completion of work.

COST OF MAINTAINING STREETS PAVED WITH ASPHALT BLOCKS FROM EXPIRATION OF GUARANTEE TO 1899.

Streets.	From	To	Completed.	Guarantee years.	Linear feet.	Area in square yards.	Original cost.	Cost per square yard.	Cost of repairs to 1899.	Cost of repairs per sq. yard per year.
Charles	Madison	Chase	1881		1,285	6,862.00	$17,155 00	$2 50	$8,169 84	$.0661
Calhoun	Edmondson ave.	Harlem ave.	4-13-83	2 yrs.	460	1,945.00	4,862 50	"	2,123 90	.085
Eutaw Place	Dolphin	North ave.	7-26-83	"	4,640	22,857.00	57,198 50	"	18,089 16	.058
Cathedral	Mt. Vernon Pl.	Madison	4-12-84	"	280	1,191.00	2,977 50	"	2,247 51	.1633
Washington Pl.	Mt. Vernon Pl.	Madison	5-10-84	"	470	4,303.00	10,757 50	"		
Mt. Vernon Pl.	W. S. Wash'n Pl	Cathedral	6-11-84	"	355	1,898.00	4,745 00	"	284 70	.0013
Madison	W. S. Wash'n Pl	Eutaw	5- 4-85	"	1,540	7,056.00	17,640 00	"	1,160 57	.0235
Monument	Park ave.	Cathedral	6- 4-85	"	581	2,585.00	6,462 50	"	41 52	
Fish Market	E. Market Sp.	Jones' Falls	6-21-86	"	247	1,617.00	4,042 50	"	101 92	.00573
Streets around		Eastern Market	7-22-86	"	910	3,653.00	9,132 50	"	1,784 99	.0444
Fulton ave.	Baltimore	Edmondson ave.	8-23-87	"	2,500	9,269.07	23,174 25	"	31,558 41	.012
Fulton ave.	Edmondson ave.	Presstman	6- 1-88	"	3,700	21,668.00	54,170 00	"		
Lafayette ave.	Eutaw Place	Fulton ave.	10-23-92	"	5,990	24,835.75	62,089 38	"	6,899 24	.0555
Streets around	Lafayette Sq.	Arlington ave. Carrollton ave. Lanvale	11-17-92	"	1,274	5,394.98	13,437 45	"		
Lexington	Pearl	Fulton ave.	5-20-93	"	5,893	25,083.32	62,708 29	"	9,836 14	.098
Saratoga	Cathedral	Fremont ave.	8- 8-93	"	3,966	16,152.00	40,380 25	"	30 53	
Eutaw Place	Madison	Dolphin	9-13-93	"	1,979	9,011.38	22,528 33	"	555 89	.0154
St. Paul	Monument	North ave.	11- 4-93	"	6,339	16,120.18	40,300 50	"		
Lafayette ave.	Mt. Royal ave.	Eutaw Place	12- 2-93	"	1,852	8,003.39	20,008 48	"		
McCulloh	Biddle	Lanvale	6- 1-94	"	1,778	7,458.57	18,646 43	"		
Pearl	Baltimore	Saratoga	10- 9-96	5 yrs.	1,287	4,510.94	9,518 08	2 11		
Mt. Royal ave.	Lanvale	North ave.	10- 9-96	"	1,626	11,546.74	28,835 94	2 064		
McCulloh	Eutaw	Biddle	12-15-96	"	882	4,070.87	8,223 16	2 02		
Patterson ave.	Fremont ave.	Fulton ave.	11-17-97	"	2,542	11,264.80	25,345 80	2 25		

Report of O. W. Connet, Asst. City Commissioner.

BALTIMORE, MD., January 1, 1899.

Mr. W. W. Varney, City Commissioner:

DEAR SIR: I submit herewith the annual report of the work done under my direction during the year ending December 31, 1898:

From January 1 to March 15 I had charge of all work relating to street repairs east of Charles street and Jones' Falls. The accounts and reports for this work have been turned over to Mr. Patterson, Assistant City Commissioner, who has had charge of this work since that date, and whose report covers all repairs to paved streets.

During the year the following work has been done under my direction, viz.: All work relating to new street construction; repairs and painting of bridges; supervision of Light-street bridge; inspection of footways, and notices to pave and repair same; grade establishments; repairs to wall of Jones' Falls at foot of Falls street; supervision of repairs on guaranteed streets; paving footway around Collington Square; private contracts; enforcement of repairs on guaranteed streets, etc., etc.

Following is a list of streets which were guaranteed for two (2) years, and the guarantee has expired during the year and final payment made to the contractor:

Carey street; Cumberland to 235 feet north; Harmanson street; McHenry street, to 70 feet north; Preston street; Patterson Park avenue to Chester; Preston street from Washington street to Gay street; Montrose street, Monroe street to 269 feet east; Federal street, (north half), N. W. corner of Eden street to 20 feet 3 inches, front; Eastern avenue, Luzerne street to eastern city limits; Preston street from Chester street to Potomac street; Wolfe street from Biddle street to Gay street; Luzerne street from Eastern avenue

to Canton; Jefferson street from Patterson Park avenue to Milton avenue; Johnson street from Randall street to Wells street; Brevard street from Preston street to Biddle street; Rose street from Foster street to Fait street; McCulloh street from North avenue to Druid Hill avenue; Riggs avenue from Fremont avenue to Calhoun street; Cannon street from Eastern avenue to Fait avenue; Presbury street from Fulton avenue to Mount street; Fulton avenue from Clifton avenue southward; Montford avenue from Baltimore street to Monument street; Chase street from Castle street to Patterson Park avenue; Whitelock street from Linden avenue to North avenue; intersection of Canton street and Luzerne street; Montrose street from Payson street to Monroe street; Orleans street from Luzerne street to Patapsco street; McElderry street from Luzerne street to Patapsco street; Chester street from Eager street to Biddle street; Kirby's lane from Mosher street to Riggs avenue; McElderry street from Milton avenue to Luzerne street; Clement street from Hull street to Garrett avenue; Milton avenue from Orleans street to Monument street; Barclay street from North avenue to Twenty-first street; intersection of Oliver street, Harford avenue and Central avenue; Patapsco street from Baltimore street to Monument street; Oliver street from Aisquith street to Harford avenue; Luzerne street from Fayette street to McElderry street; Montrose street, south half, 150 feet; Spring street from Preston street to Hoffman street; Oliver street, Greenmount avenue to Guilford avenue; Lanvale street from Bond street to Broadway; Federal street from Aisquith street to Eden street.

The repairs to improved pavements under guarantee have been made from time to time by the contractors either on their own motion or on notice from this office.

SHEET ASPHALT AND GRANITE BLOCKS.

During the year two (2) important thoroughfares were paved with sheet asphalt and granite blocks, viz.: Mt. Royal avenue from Guilford avenue to Dolphin street, and Fulton avenue from Presstman street to Pennsylvania avenue.

Mt. Royal avenue—The work on this street was done under authority of Ordinance No. 74, approved May 27, 1898. The contract was awarded to the Southern Asphalt Paving Company. The work was begun on August 9, and completed October 31. That part of the avenue from the west side of Guilford avenue to the east side of Charles street, and from the west side of Charles street to the east side of Cathedral street, was paved with Alcatraz sheet asphalt, and from the west side of Cathedral street to the northwest side of Dolphin street with Woodstock granite blocks. The asphalt pavement has a six (6) inch concrete base, one and one-half (1½) inch binder, and two (2) inch wearing surface, and cost one dollar and fifty-two cents ($1.52) per square yard. Vitrified brick gutters constructed of one brick at right angles to the kerb and a course in the direction of the kerb next to the asphalt were used where there is house drainage. The granite block pavement has a six (6) inch concrete base, six (6) inch granite blocks with joints poured with coal tar and asphalt cement, and cost two dollars and sixty cents ($2.60) per square yard. The pavement is guaranteed by the contractor for five (5) years from October 31, 1898. The amount appropriated in the ordinance was forty-eight thousand dollars ($48,000). The total cost of the street, including engineering, inspecting, advertising, etc., is thirty-nine thousand one hundred and twenty-four dollars and sixty-seven cents ($39,124.67). The cost of the work was as follows:

SOUTHERN ASPHALT PAVING COMPANY—FINAL ESTIMATE.

Sheet asphalt paving	18,603.5	sq. yds.	at	$1.52	$28,277 32
Granite block	2,429.3	sq. yds.	at	2.60	6,316 18
New 6-inch kerb	270.5	lin. ft.	at	.70	189 35
Old 6-inch kerb reset	2,732.4	lin. ft.	at	.13	355 21
Old 4½-inch kerb reset	333.3	lin. ft.	at	.12	40 00
New 4½-inch headers	777.3	lin. ft.	at	.60	466 38
Three-foot open stone gutters	37.5	lin. ft.	at	3.30	123 75
Vitrified brick gutters	1,203.3	sq. ft.	at	.23	276 76
Cobble repaving	9,716	sq. ft.	at	.03	291 48
Old flags set on concrete	104	sq. yds.	at	1.49	154 96
Old flags set on sand	1,089.2	sq. ft.	at	.08	87 14
Belgian blocks relaid on concrete	69.2	sq. yds.	at	1.22	84 42
Belgian blocks relaid on sand	4,212	sq. ft.	at	.05	210 60
Old belgian blocks poured with tar	136.5	sq. yds.	at	.20	27 30

Special circles	12.3	lin. ft.	at	$2.25	$ 27 68
Hauling old cobble-stone one mile.	1,873	cu. yds.	at	.30	561 90
Hauling old kerbstone one mile....	231.5	lin. ft.	at	.06	13 89
Hauling old flagstone one mile.....	6,144	sq. ft.	at	.04	245 76
Hauling old gutterstone one mile...	5,200	lin. ft.	at	.04	208 00
Hauling belgian and asphalt blocks one mile.....	16,140	blocks	at	4.00-M	64 56
Force account work on inlets, manholes, etc.....					91 37
Total amount of contract.....					$38,114 01
Ten per cent. amount retained for five (5) years.....					3,811 40
Amount paid contractor in 1898					$34,302 61
Amount paid for advertising.....				$15 50	
Amount paid for inspecting.....				672 00	
Amount paid for engineering.....				138 64	
Amount paid for cement moulds.....				21 60	
Paving footway intersections, city labor.....				21 01	
Stone-cutting and miscellaneous, city labor.....				141 91	
					1,010 66
Total amount paid out in 1898.....					$35,313 27
Add amount retained for five (5) years as above.....					3,811 40
Total final cost.....					$39,124 67

Fulton avenue—The work on this street was done under Ordinance No. 76, approved May 27, 1898. The contract was awarded to the Southern Asphalt Paving Company. Work was begun on September 9 and completed on December 15, and is guaranteed for five (5) years by the contractor.

The Alcatraz Sheet Asphalt was used on a six (6) inch concrete base, one and one-half (1½) inch binder course and two (2) inch wearing surface. Gutters of vitrified brick were constructed where there is house drainage. Three bricks at right angles were used, the surface being a continuation of the surface of the asphalt to the kerb. The parking in the centre of the street was continued to Pennsylvania avenue similar to that south of Baker street.

The property owners were assessed for two-thirds of the cost of the work directly in front of their property, except that the city made an allowance for the old cobble paving and paid for the difference in the cost of vitrified brick gutters over the cost of sheet asphalt.

The pavement between the tracks and for two (2) feet on either side was constructed of vitrified brick, and paid for by the Baltimore City Passenger Railway Company.

The total cost of the street was thirty thousand six hundred and twenty-eight dollars and ten cents ($30,628.10). The amount assessed against the property owners is thirteen thousand sixty-two dollars and thirty one cents ($13,062.31).

SOUTHERN ASPHALT PAVING COMPANY—FINAL ESTIMATE.

Asphalt paving	11,424.4	sq. yds.	at	$1.54	$17,593 58
New 6-inch kerb	5,480.45	lin. ft.	at	.95	5,206 43
New 5-inch kerb	1,721.3	lin. ft.	at	.95	1,635 23
Six-inch kerb reset	3,240.2	lin. ft.	at	.13	421 23
Six-inch kerb redressed in place	290.6	lin. ft.	at	.13	37 78
Five-inch kerb redressed in place	560.3	lin. ft.	at	.13	72 84
Kerb reset in cross streets	68.9	lin. ft.	at	.12	8 27
New 4½-inch headers	518.7	lin. ft.	at	.65	337 15
Open stone gutters	298	lin. ft.	at	3.40	1,013 20
Vitrified brick gutters	4,855.2	sq. ft.	at	.27	1,310 90
Cobble repaving	5,012.6	sq. ft.	at	.03½	175 44
Asphalt block repaving	50	sq. yds.	at	.80	40 00
Old cobble-stone hauled one mile	910	cu. yds.	at	.35	318 50
Old kerbstone hauled one mile	2,390.3	lin. ft.	at	.07	167 32
Old gutter-stone hauled one mile	417.5	lin. ft.	at	.04	16 70
Old flagstone hauled one mile	2,914	sq. ft.	at	.04	116 56
Belgian block repaving	21.9	sq. yds.	at	.36	7 88
Flagging reset	20	sq. ft.	at	.08	1 60
Extra grading	951	cu. yds.	at	.20	190 20
Special 12-foot radius kerb circle	37.75	lin. ft.	at	2.38	89 84
Force account work—changing manholes, sewer inlets, cutting cement sidewalks, etc					50 37
Total amount of contract					$28,811 02
Ten per cent. retained for five (5) years					2,881 10
Amount paid contractor in 1898					$25,929 92
Amount paid for advertising				$47 88	
Amount paid for inspecting				497 33	
Amount paid for engineering				809 80	
Amount paid for cement moulds				21 60	
Paving footway intersections, city labor				298 86	
Stone cutting and miscellaneous, city labor				141 61	
					$1,817 08
Total amount paid in 1898					$27,747 00
Add amount retained for five (5) years as above					2,881 10
Total final cost					$30,628 10

I would suggest the advisability of laying sheet asphalt over the present cobble-stone pavement on streets where this pavement already exists. This would reduce the cost of paving with sheet asphalt fifty (50) to sixty (60) cents per square yard and give good results. This method has been used in a number of cities and has proven satisfactory.

One of the most important items in any pavement is the cost of maintenance. The thing sought is to get a good pavement and have it kept in good repair for a long period at the least total cost. I believe that a better method of obtaining this result than the present one of soliciting bids on the price per square yard with a five-years' maintenance clause would be to fix the price per square yard in the ordinance and have the contractors compete on the time which they will maintain the pavement. The specifications to be explicit as to the condition the pavement is to be in at the end of the guarantee and how it is to be maintained during the guaranteed period.

ASPHALT BLOCKS.

Grant street from Baltimore street to German street was paved with asphalt blocks under authority of Ordinance No. 71 of 1898. The Evening News Publishing Company paying one-half (½) the cost and the city the rest. The contract was awarded to the Maryland Pavement Company on July 15 for a lump sum of six hundred and fifty dollars ($650), they paying for the advertising, etc. The pavement has a concrete base of six (6) inches, on this was spread a coat of cement mortar one (1) inch thick. The blocks were bedded in this mortar and the joints grouted with neat cement. The blocks are 4x4x12 and made of trap rock and Trinidad Lake asphalt. The pavement is guaranteed for five (5) years from July 30, 1898. An eight (8) inch terra-cotta pipe was laid from the alley south of Baltimore street to German street. The area of paving is 266 square yards.

COBBLE-STONE PAVEMENTS.

The amount of cobble-stone pavement laid this year was about the same as in the past two (2) years, owing to the fact that several of the ordinances passed in 1893, 1894, 1895 and 1896 were not

carried out until this year, but the number of ordinances and the amount of work called for in them which have passed this year are considerably less than in the previous years. One at least of the prominent builders in the city has reached the conclusion that a smooth pavement in front of a new row of houses is a good investment and has put down vitrified brick on concrete. These and other facts indicate that the sentiment in favor of improved pavement is growing even among those who have to pay the bills. The total length of cobble pavement laid was a little over three (3) miles. The work was done by contract. The amounts charged to the city are paid out of the funds for "cross streets" and "repairs of paved streets." The accompanying table shows all information as to cost and amount of work done on streets completed in 1898, including twenty-one thousand eight hundred and sixty-two dollars and thirty-six cents ($21,862.36) paid in 1896 and 1897

Work on Collington avenue from McEldery to Chase street, under Ordinance No. 80, was begun on August 27 and is not yet completed, but will be during January, 1899. The total amount expended to December 31, 1898, was four thousand eight hundred and nineteen dollars and ninety-five cents ($4,819.95). Of this amount two hundred dollars ($200) was charged to "cross streets," four hundred and thirty dollars ($430) to "repairs of paved streets," and the balance to paving Collington avenue, which amount was four thousand one hundred and eighty-nine dollars and ninety-five cents ($4,189 95). The street does not appear in the table as it is not completed.

The total amount spent during the year on new cobble pavements was fifty-three thousand three hundred and ninety-two dollars and forty eight cents ($53,392.48), of this amount the property owners paid thirty-six thousand three hundred and thirteen dollars and twelve cents ($36,313.12) and the city seventeen thousand seventy-nine dollars and thirty-six cents ($17,079.36).

NEW COBBLE PAVING PAID FOR BY ASSESSMENT DURING 1898. EXHIBIT No. 1.

No.	Street.	From	To	Begun	Completed.	Ordinance.	Contractor.	Cost to Property Owners.	Cost to City.	Total Cost.
1	Madison	Wolfe	Bradford	12-12, 1897	4-16, 1898	No. 12, 1897	P. Reddington	$4,857 17	$2,517 38	$7,374 55
2	Richardson	Clement	Beason	8-29, 1898	9-14, 1898	" 91, 1894	P. Reddington	1,616 40	14 29	1,630 69
3	Scott	Stockholm	Ridgeley	6-24, 1898	8- 6, 1898	" 129, 1894	Jas. McGovern	1,943 20	700 75	2,643 95
4	Beason	Andre	Stewart	5-15, 1898	7-20, 1898	" 90, 1894	M. F. Leonard	688 76	1,348 10	2,036 86
5	Andre	Clement	Marriot	5-15, 1898	8-30, 1898	" 162, 1893	M. F. Leonard	2,531 61	1,362 77	3,894 38
6	Castle	Monument	Eager	4-15, 1898	5-12, 1898	" 124, 1893	P. Reddington	1,573 55	856 82	2,430 37
7	Durham	Lanvale	North ave	8-15, 1898	9-15, 1898	" 35, 1897	Jas. McGovern	1,655 53	418 51	2,074 04
8	Hamburg	Riverside	Federal Hill	4-21, 1898	6- 9, 1898	" 101, 1895	Geo. Klein	1,284 20	206 98	1,491 18
9	Girard	Greenmount	Guilford	6- 3, 1898	6-18, 1898	" 27, 1897	P. Reddington	1,378 20	1,004 85	2,383 05
10	Twenty-first	Guilford	Barclay	3-10, 1898	3-21, 1898	Petition	Jas. McGovern	141 26	300 28	741 54
11	Cannon	Oliver	Monument	6-10, 1896	6- 2, 1898	No. 100, 1895	Jas. McGovern	22,782 05	2,435 01	25,217 06
12	Carey	Presstman	North ave	3- 9, 1898	6-28, 1898	" 151, 1896	Jas. McGovern	1,641 52	645 03	2,286 55
13	Payson	Baltimore	Fayette	5-28, 1898	6- 4, 1898	" 60, 1897	P. Reddington	720 12	301 90	1,022 02
14	Pulaski	Baltimore	Lexington	4-17, 1898	5-30, 1898	" 20, 1898	P. Reddington	2,877 89	783 72	3,661 61
15	Druid Hill ave.	Clendenin	Whitelock	7-26, 1898	8- 1, 1898	" 81, 1897	P. Reddington	258 21	28 24	286 45
16	Kirby's lane	Franklin	Lanvale	6-20, 1898	7-27, 1898	" 64, 1897	P. Reddington	1,326 25	1,092 72	2,418 97
17	Mulberry	Fulton	Kirby's lane	9-19, 1898	10-19, 1898	" 14, 1897	Jas. McGovern	432 91	87 57	520 48
18	Alley in Walbrook	between Eighth & Ninth		3- 8, 1898	3-17, 1898	Health	M. F. Leonard	455 87	1,596 60	2,052 47
19	Twenty-third	Oak	York road	6-20, 1898	9-12, 1898	No. 142, 1896	P. Reddington	2,878 14	2,486 65	5,364 79
20	Henry	Randall	Fort ave.	6- 8, 1898	7- 1, 1898	" 55, 1898	M. F. Leonard	510 99	306 03	817 02
21	Calhoun	Presstman	Baker	8- 8, 1898	10-12, 1898	" 161, 1896	Jas. McGovern	838 77	635 19	1,473 96
22	Alley between	McKim and	Hillman	1-12, 1898	1-19, 1898	" 13, 1897	P. Reddington	111 56	80 19	191 75

No.	Lineal Feet.	Grading.		New Cobble Paving.		Cobble Repaving.		New Kerb Set.		Kerb Reset.		New Flags.		Flags Reset.		New Gutter.		Inspection, Salaries, etc.	Miscellaneous.
		Cu. yds.	Cts.	Sq. yds.	Cts.	Sq. yds.	Cts.	Lin. ft.	Cts.	Lin. ft.	Cts.	Sq. ft.	Cts.	Sq. ft.	Cts.	Lin. ft.	Cts.		
1	1,818	1,182, at	.10	50,105, at	.06½	21,511, at	.04	2,589, at	.50	433, at	.08	3,171, at	.31	609, at	.06			$97 00	$90 29
2	450	2,706, "	.15	9,043, "	.07	206, "	.03	856, "	.50			20, "	.34						150 80
3	155	5,200, "	.10	19,114, "	.06¼			865, "	.60			1,096, "	.32						57 82
4	345	2,000, "	.14	14,481, "	.07¼	256, "	.03	677, "	.53	24, "	.08	145, "	.33					146 00	45 49
5	905	3,658, "	.14	31,520, "	.07¼	8,560, "	.03	965, "	.53	350, "	.08	452, "	.33	315, "	.10			64 00	53 89
6	760	1,423, "	.12	12,981, "	.06½	12,569, "	.03½	1,025, "	.50	291, "	.08	1,191, "	.21	93, "	.06				76 27
7	865	747, "	.15	15,175, "	.07	1,006, "	.03¼	1,266, "	.50	7, "	.10	552, "	.32						54 16
8	486	1,220, "	.20	10,932, "	.05¾	496, "	.03	827, "	.37	97, "	.10			150, "	.05¾			165 11	89 85
9	700	878, "	.10	17,583, "	.06½	11,310, "	.03	696, "	.50	224, "	.07	1,085, "	.32	2,291, "	.01				67 03
10	370	335, "	.17	6,032, "	.06½	8,376, "	.03			146, "	.10								26 63
11	3,300	10,363, "	.22	135,164, "	.07	7,052, "	.03	6,057, "	.10	166, "	.10	4,521, "	.34					2,341 47	324 53
12	610	1,962, "	.12	17,725, "	.05¾	2,129, "	.02½	1,184, "	.48	96, "	.05	510, "	.33	77, "	.02	18, at	.25	66 66	147 24
13	225	194, "	.12½	8,583, "	.06	656, "	.03½	422, "	.60	70, "	.07	380, "	.32						12 74
14	855	1,533, "	.12½	24,746, "	.06	10,555, "	.03	1,322, "	.60	196, "	.07	1,515, "	.32						12 82
15	205	97, "	.20	1,731, "	.07½	307, "	.03	199, "	.50										25 89
16	1,330	1,020, "	.15	13,599, "	.06	11,917, "	.03	1,052, "	.50	485, "	.08	1,352, "	.32	374, "	.06	108, "	.15		56 42
17	180	214, "	.15	3,927, "	.06½	1,321, "	.03½	217, "	.52	4, "	.08	111, "	.32						37 62
18	170	5,230, "	.23	8,198, "	.08½			60, "	.48			170, "	.35						61 34
19	1,813	1,383, "	.15	10,954, "	.06½	37,789, "	.03½	412, "	.50	1,489, "	.08	2,488, "	.31	2,291, "	.06				202 31
20	100	122, "	.23	1,181, "	.08	612, "	.03½	228, "	.50	51, "	.08	141, "	.32						101 66
21	730	1,169, "	.14½	9,347, "	.05¾	11,155, "	.02½	455, "	.48	54, "	.05	688, "	.33	67, "	.02½				38 65
22	86	55, "	.20	802, "	.07	999, "	.04	23, "	.50	32, "	.07	70, "	.34						16 98

BRIDGES.

Repairs and painting—The repairs and painting of bridges was continued during the year, attention being first paid to the floors of the roadway, then the cleaning and painting of those bridges which have been neglected longest. The same methods were used as last year. The wrought-iron and steel members of the bridges which were painted this year were many of them in very bad condition. Scales of rust were found one-quarter (¼) of an inch thick. This condition ought not to exist; first, because the labor to clean this rust off is one of the largest items in painting the bridges, and the painting cannot be so well done over the rusted surface; second, the life of the bridge is very much shortened. Many of the most expensive bridges are over steam railway tracks and should have frequent and strict attention given to the paint.

Chase street and Biddle street bridges were found to be in bad condition and work was bugun on them, but owing to the lack of funds they were not completed. It is essential that these expensive structures should be painted as soon as there is any indication of the paint coming off.

The four (4) inch wrought-iron supply pipe for the motor at Block street drawbridge, which was under the east channel, was eaten by acids and gave away. This pipe was taken out and replaced by a four (4) inch cast-iron flanged pipe and the joints fastened with composition bolts.

Three bridges, Canton avenue, Fayette street and Center street, were painted by special agreement with the City Commissioner in August, and have not yet been paid for.

The following statements show the character of work done and cost of labor on each bridge repaired or painted.

It will be necessary to repave the roadway over Calvert street bridge this year. The sheet asphalt surface was originally laid in 1880, and has been relaid once since that time. The surface is full of holes and the water standing in them soaks through to the buckle-plates, rusting them and damaging the members of the floor system.

CITY BRIDGES.

	Labor.	Material.	Total.
Canton-avenue Bridge—			
Repairing floor		$ 61	$ 61
Aliceanna and Central-avenue Bridge—			
New floor	$189 69	116 13	305 82
Boston-street Bridge—			
New road and footway	34 98	96 32	131 30
Lombard-street Bridge—			
Repairing floor	68	92	1 60
Gay-street Bridge—			
Wrought-iron fence in place		16 80	16 80
Eastern-avenue Bridge—			
Repairing floor	42 49	169 79	212 28
Harman's Bridge—			
Repairing floor	66.50	177 90	
Miscellaneous		79	
	$66 50	$178 69	$245 19
Columbia-avenue Bridge—			
Repairing footway	$4 75	$1 14	$5 89
St. Paul-street Bridge—			
Tightening up rods	132 17	20 19	152 36
Leadenhall-street Bridge—			
Repairing floor		26	26
Bath-street Bridge—			
Repairing floor	115 22	109 37	
New footways	25 61	18 99	
Painting	39 75		
	$180 58	$128 36	$308 94
Guilford-avenue Bridge—			
Repairing floor and stringers	$168 99	$324 83	
New floor and stringers	273 84	366 94	
Scraping	26 25		
Painting	150 79	38 45	
	$619 87	$730 22	$1,350 09
Charles-street Bridge—			
Scraping	$544 57	$7 10	
Painting	656 25	171 74	
Spouts and elbows in place		14 75	
	$1,200 82	$193 59	$1,394 41
South Monroe-street Bridge—			
Repairing floor	$17 83	$28 37	
Scraping	726 22		
Painting	500 25	127 25	
	$1,244 30	$155 62	$1,399 92
Chase-street Bridge—			
Scraping	$879 12		
Painting	585 75	$185 42	
	$1,464 87	$185 42	$1,650 29

CITY BRIDGES—Continued.

	Labor.	Material.	Total.
Biddle-street Bridge—			
Repairing floor	$1 50		
Scraping	1,600 79		
Painting	514 75	$104 23	
New iron hand-rail, in place		58 00	
	$2,117 04	$162 23	$2,279 27
Maryland-avenue Bridge—			
Scraping	$221 26		
Painting	383 40	$7 16	
Corrugated-iron plates		32 20	
	$604 66	$39 36	$644 02
Hillen-street Bridge—			
New footways and stringers	$155 23	$125 33	
Scraping	69 92		
Painting	69 55	4 28	
	$294 70	$129 61	$424 31
Argyle-avenue Bridge—			
Repairing floor	$5 00	$2 43	
Scraping	269 14		
Painting	455 92	59 35	
	$730 06	$61 78	$791 84
Monument-street Bridge—			
New floor	$190 39	$179 84	
Scraping	66 66		
Painting	117 67	3 78	
	$374 72	$183 62	$558 34
Madison-street Bridge—			
New sidewalks and stringers	$95 75	$148 89	
New roadway	83 50	32 63	
Scraping	45 00		
Painting	132 42	5 25	
	$356 67	$186 77	$543 44
North Monroe-street Bridge—			
New floor, stingers and footway	$205 41	$437 18	$642 59
Light-street Bridge—			
Supplies		$13 10	$13 10
Block-street Drawbridge—			
Supplies for 1898		$51 79	
New roadway	$104 27	213 36	
Repairs to machinery		51 71	
Renewal of water-pipe	316 20	122 86	
Dredge and scow	173 00		
First repairs to water-pipe	48 50	44 61	
Divers and apparatus	105 00		
Second repairs to water-pipe, diver	35 00	5 75	
	$781 97	$490 08	$1,272 05
Miscellaneous			$6 53

ANNEX BRIDGES.

	Labor.	Material.	Total.
Edmondson-avenue Bridge—			
Repairing floor	$24 50	$14 06	
Laying new floor (450x30)	373 67	780 95	
	$398 17	$795 01	$1,193 18
Kate-avenue Bridge—			
Repairing floor	$4 00	$11 37	$15 37
Dorsey-run Bridge—			
Repairs to woodwork	11 00	18 10	$29 10
Union-avenue Bridge—			
Repairing all woodwork	259 43	322 91	
Scraping	227 30	.....	
Painting	121 87	49 05	
	$608 60	$371 96	$980 56
Cedar-avenue Bridge—			
Repairing floor	$1 83	$2 72	
Laying new floor	151 09	275 02	
	$152 92	$277 74	$430 66
Clipper Mill Foot Bridge—			
Repairing floor and hand-rail	$59 80	$21 95	$81 75
Merryman's lane Bridge—			
Repairing roadway	3 67	4 73	
Laying new woodwork and floor	375 03	254 22	
Scraping	156 68	.....	
Painting	113 98	107 80	
	$649 36	$366 75	$1,016 11
Morris-avenue Bridge—			
Repairing floor	$7 67	$6 36	$14 03
Calverton-road Bridge—			
Repairing floor	11 84	2 76	$14 60
Slingluff-avenue Bridge—			
Repairing floor	58 28	122 31	
New iron plates	.....	5 00	
	$58 28	$127 31	$185 59
Slingluff and Beech avenue Bridge—			
Repairing floor	$3 67	$3 45	
New floor	39 05	73 55	
	$42 72	$77 00	$119 72
Slingluff ave., south of North ave.—			
New floor	$240 81	$130 66	
Painting	12 00	13 25	
	$252 81	$143 91	$396 72
Stafford and Eighth streets Bridge—			
Repairing floor and hand-rail	$9 00	$11 60	$20 60
			$4,497 99

LIGHT STREET BRIDGE.

Light street, or Long Bridge, is one of the great highways to Baltimore. It is four thousand seven hundred and fifty-four (4,754) feet long, composed of a steel pivot span two hundred and nineteen (219) feet long, and four thousand five hundred and thirty-five (4,535) feet of pile approaches. It can readily be seen that to keep five-eighths (5/8) of a mile of plank floor in repair will require a large amount of labor and material, and especially so on a bridge with so large an amount of travel as this one has. The importance of doing this can be seen from the following table giving the travel over the bridge and through the draw for the year 1898:

Travel Across Bridge.		*Boats Through Draw.*	
Double teams	163,071	Tugs and steamers	8,933
Single "	123,414	Sailing vessels	2,795
Carriages	22,664	Barges of all kinds	7,613
Total	309,149	Total	19,341

The draw was opened ten thousand two hundred and eighteen (10,218) times, or an average of twenty-eight (28) times for each day in the year.

The force consists of an engineer in charge, two (2) deck hands and a night watchman. This force has tended the engine and draw, besides making all minor repairs to the draw, machines, engine-house, dwellings, piping and floor of the bridge. During the year four hundred and forty-seven (447) planks were renewed by this force, in addition to the seven hundred and forty (740) lineal feet of floor renewed by new plank.

About twenty-three hundred (2,300) lineal feet of floor should be renewed this year. Some of this is in bad condition and will need new stringers and double floors.

The steel members of the draw span are badly rusted and will need to be cleaned and painted this year.

Following is the cost of maintenance and repairs for the year:

Salaries for maintenance	$2,934 68
Coal for furnace and advertising	182 70
Oil for engines and lamps, paint, nails, etc.	160 87
Repairs to machinery and piping	101 15
Lumber for new floor	1,604 20
Labor " " "	411 62
Repairs to house	16 80
	$5,412 02
Unexpended balance	87 98
Appropriation	$5,500 00

CROSS STREETS.

The charges to this account are principally for new paving in street intersections, but they also include repairs on covered gutters, new footways and repairs at street intersections, repairs to flagstones, etc.

The charges on account of new paving is shown in the table for new cobble streets under the head of cost to the city.

REPAIRS TO COVERED GUTTERS.

The wooden sills under the iron-covered gutters require repairs and renewal from time to time. Many of these gutters are paved with cobble-stone, which is rough and cannot be kept clean. These should be taken out and paved with brick on edge. In this connection I would call attention to the large number of covered gutters along the line of the street railways which extend only two (2) feet outside of the rail, leaving an abrupt drop of from one (1) to two (2) feet in the middle of the street, which is dangerous. All of these gutters should extend to the building line, and future street railway ordinances should provide that they be extended all the way across the street, or that pipes be carried under the tracks.

At Park avenue and Camel alley the gutters were entirely remodeled and rebuilt, with brick bottoms and new sills.

The following list shows the location and cost of work done on gutter-plates:

Location.	*Labor.*	*Material.*	*Total.*
Jackson and Aisquith streets	$5 79	.....	$5 79
Baltimore and Hanover streets	5 80	.....	5 80
Baltimore and North streets	5 80	.....	5 80
Charles and Preston streets	57 99	$38 21	96 20
Mount street and Wilkins avenue	4 75	.....	4 75
High and Granby streets	4 33	2 16	6 49
Eutaw and Lexington streets	4 33	1 34	5 67
Baltimore and Holliday streets	18 33	8 54	26 87
Calvert and Lombard streets	3 99	23	4 22
Lombard and Stricker streets	4 00	1 19	5 19
Pratt and Monroe streets	4 00	2 27	6 27
Biddle and Washington streets	83	.....	83
Wolfe and Thames streets	2 16	.....	2 16
North and Pleasant streets	2 12	53	2 65
Hopkins and German streets	6 47	.....	6 47
Wilkins avenue and Monroe street	11 59	8 75	20 34
Poppleton street and Columbia avenue	4 25	92	5 17
Hanover and Camden streets	4 25	68	4 93
Canton and Ann streets	18 00	.....	18 00
Canton and Wolfe streets	45 00	2 00	47 00
Franklin and Carrollton avenues	28 01	14 21	42 22
Lombard and Fremont streets	10 50	1 82	12 32
Franklin and Greene streets	10 50	3 94	14 44
Charles and Camden streets	.....	3 18	3 18
Warner and Ostend streets	6 66	26 90	33 56
Fayette and Frederick streets	6 51	4 32	10 83
Baltimore and Caroline streets	3 00	1 21	4 21
Park avenue and Camel alley	119 92	85 18	205 10
	$403 38	$207 58	$610 96

Three stone gutter-covers were broken and replaced with new ones, and on account of the long time required to get them from the quarry one was bought and taken to Belair Lot. These stones are of granite, five (5) feet by five (5) feet by six (6) inches, and are expensive. The second stone at Fayette and Front streets which broke was replaced by a Falls road stone on June 1 at less than half the cost of the granite stone, and is in good condition at this time, so that I think this kind of stone could be used for this purpose in the future to good advantage. The cost of the stone in place is as follows:

Broadway and Orleans street,	Woodstock granite	$46 88
Delivered to Belair Lot,	" "	48 60
Fayette and Front streets,	" "	43 25
" " " "	second Falls road stone	16 75
		$155 48

FOOTWAY REPAIRS.

An unusual amount of repairs were made by the city to the footways at the street intersections, the cost of the work being charged to "cross streets." Twenty-eight (28) new intersections were paved and sixty-seven (67) old intersections were repaired. The cost of this work is as follows: Labor, $413.71; brick and sand, $139.88; a total cost of $553.59.

Following is the location of new paving and repairs, viz.:

New Paving—Mt. Royal avenue and St. Paul street, Exeter and Lexington streets, Front and Lexington streets, Crooked lane and Wyoming avenue, Little Sharp street and Crooked lane, Hopkins avenue and Chase street, Harford avenue and Madison street, Central avenue and Monument street, Linden and North avenues, Kirby lane and Edmondson avenue, Fayette and Aisquith streets, Calvert street and Mt. Royal avenue, Charles street and Mt. Royal avenue, Guilford avenue and Twenty-third street, Carey and Presstman streets, Carey and Chappell streets, Mount and Saratoga streets, McHenry and Fremont streets, Light and Randall streets, Fulton and Riggs avenues, Monument and Eden streets, Greenmount and Girard avenues, Latrobe and Girard avenues, Guilford and Girard avenues, Public School No. 10, Girard avenue, Greene and Saratoga streets, Tessier and Biddle streets, Ann street and Canton avenue. Intersections along new pavement on Mt. Royal and Fulton avenues.

Repairing—East and west sides of Hunter alley, Baltimore and Caroline streets, Canton avenue and Caroline street, Eastern avenue and Exeter street, Stiles and Albemarle streets, Fawn street and Central avenue, Watson street and Central avenue, Baltimore and Bond streets, Windsor and Boston streets, Pratt and Mill streets, Central avenue and Fayette street, Baltimore and Harrison streets, Eutaw and Franklin streets, Patterson and Fremont avenues, Fayette and Carey streets, Schroeder and Lexington streets, Arlington avenue and Lexington street, German and Paca streets, German and Greene streets, Paca and Lombard streets, Eutaw and Lombard streets, Fulton avenue and Lombard street, Cross and Hanover streets, Fort avenue and Charles street,

Bond street and Eastern avenue, Riggs and Fulton avenues, Eutaw street and Eutaw court, Eutaw and Mulberry streets, Ashland avenue and Dallas street, Monument and Dallas streets, Jefferson street and Central avenue, Monument and Ensor streets, Lafayette avenue and Barclay street, Caroline street and Eastern avenue, Caroline and Baltimore streets, Canton avenue and Caroline street, Lancaster and Caroline streets, Riverside and Fort avenues, Arlington avenue and Lombard street, Lombard street and Fremont avenue, Dover street and Fremont avenue, Hollins street and Carrollton avenue, King street and Fremont avenue, Hollins and Carey streets, Biddle and Eutaw streets, over sewer No. 1305 Bank street, school house Ashland avenue and Chester street, sewer inlets Fulton avenue and Baker street, city Nos. 822 and 824 North Front street, inlet Tessier and Biddle streets, intersections along new pavement on Mt. Royal and Fulton avenues.

FLAG AND STEPPING-STONES, CITY.

There is a large number of street crossings paved with cobblestone in the city which ought to be replaced by flagstones, but the amount appropriated from year to year is entirely inadequate to do this. The flagstone crossings which have been put down under my direction are as follows:

New Flags In the City.	*Labor.*	*Material.*	*Total.*
Collington avenue and Hoffman street..	$25 75	$47 99	$73 74
Hill between Sharp and Hanover streets.	27 42	60 67	88 09
Jackson and Clement streets.....	32 41	48 54	80 95
Bethel and Federal streets.....	25 75	48 97	74 72
Mount and Lorman streets.....	37 91	48 31	86 22
Saratoga and Rock streets.....	25 75	40 98	66 73
White and Monroe streets.....	15 03	19 45	34 48
Jefferson and Republic streets.....	17 18	4 80	21 98

Besides the above list of new crossings repairs were made to a number of old crossings.

The total amount expended was six hundred and sixty-four dollars and forty-eight cents ($664.48).

PAVING IN FRONT OF CITY PROPERTY.

Work done and paid for out of this fund was in connection with the paving of Girard avenue, an alley south of North avenue, between Eighth and Ninth streets, and on Kirby lane, and was for cobble paving opposite school-houses.

The amount spent in this way was five hundred and twenty-one dollars and sixty-one cents ($521.61).

COLLINGTON SQUARE FOOTWAY.

Under authority of Resolution No. 76, approved June 8, 1898, the sidewalk around Collington Square was paved with brick. The contract was awarded to William H. Doe at six and seven-eighths (6⅞) cents per square foot. The cost of the work was as follows:

24,640	square feet	brick pavement at 6⅞ cents	$1,694 00
1,235	"	" on edge, etc., at 6⅞ cents	84 90
260	"	repaving at 4 cents	10 40
Advertising			19 38
			$1,808 68

STREEPER STREET BOARD-WALK.

On account of the necessity of providing a footway to the new school-house on Eastern avenue and Patuxent street for the children southeast from it Resolution No.98 was passed authorizing the City Commissioner to provide a board-walk four (4) feet wide on Streeper street from Fait avenue to Eastern avenue, a distance of eight hundred and sixty (860) feet. The cost was as follows: Lumber, $119.67; nails, $3.20; labor, $149.83; a total cost of $272.70.

PHILADELPHIA ROAD BOARD-WALK.

This walk, which was built years ago as a cover to a drain-box, was in a dangerous condition, and was repaired from Patapsco street to near the eastern city limits at a cost of $53.33 for labor, $53.75 for material; a total of $107.08.

JONES' FALLS WALL.

The east wall of Jones' Falls at the foot of Falls street was in bad condition in 1897, and work was begun on the tearing down of and rebuilding of about thirty-two (32) lineal feet of the wall in December, 1897, under a resolution passed for the purpose. The work was finished in January, 1898. The wall had been pushed out by the pressure of the earth behind and was about to fall down.

About five hundred (500) cubic yards of earth was excavated, one hundred (100) cubic yards of masonry taken down and rebuilt, with new stone on the face of the wall, new coping and a new iron fence on top. The cost was as follows: Labor, $640.91; wall stone, $54.25; coping stone, $61.33; cement, $60.50; iron fence, $34.65; sand, pipe, lumber, rent of lot, etc., $56.48; total, $908.12. Work was begun on December 7, 1897, and completed on January 20, 1898.

PAVING IN FRONT OF PRIMARY SCHOOL NO. 34.

Resolution No. 61 directed the City Commissioner to pave Sargent street in front of Primary School No. 34. The appropriation was $175. The cost was as follows: Labor, $74.49; material, $100.51; a total cost of $175.

PRIVATE CONTRACTS.

There were fourteen (14) contracts entered into on application of owners of property to have certain streets graded, paved and kerbed by private contracts. Some of these were only to set kerb; others to pave the street complete. Bonds were given to maintain the work done by the contractor in good repair for two (2) years, and deposits were made to pay for inspection. In connection with these contracts and the regular contracts for paving streets there was a certain amount of work required to be done in the cross streets at the expense of the city and charged to the cross street and repairs of paved streets funds. They are as follows:

George Klein, paving footway at Hamburg street and Riverside avenue	$5 75
M. F. Leonard, drain-box at alley near Eighth street	6 97
M. F. Leonard, culvert on Andre street	146 09
Thomas F. Locke, paving Riggs avenue and Monroe street	140 48
James P. McGovern, paving Payson and Lanvale streets James P. McGovern, paving Payson street and Lafayette avenue	119 06
George Klein, paving Riverside avenue	265 01
James P. McGovern, paving Chappell street west of Carey street	59 45
Southern Asphalt Paving Co., repairs to Lexington street	5 00

The last three items were charged to repairs to paved streets and the rest to cross streets.

OLD MATERIAL.

The amount of old lumber from bridges sold for the Comptroller during the year was ninety-four dollars and fifty cents ($94.50); old cobble-stone and asphalt block, nine dollars ($9.00); a total of one hundred and three dollars and fifty cents ($103.50).

FOOTWAY NOTICES.

During the year three thousand (3,000) complaints of footways out of repair and needing new pavements were investigated, and two thousand six hundred and thirty-nine (2,639) notices were sent out.

Many of the complaints are trivial and add unnecessary work to the Inspector.

ANNEX ACCOUNT.

The work under my charge in the Annex was the repairs and painting of bridges, the paving of Twenty-first and Twenty-third streets, inlets at Charles and Twenty-fourth streets, flagstones, footways, etc.

BRIDGES.

The most extensive repairs made to bridges in the Annex were on Edmondson-avenue bridge, where an entirely new floor was laid. The floor is four hundred and fifty (450) feet long by thirty (30) feet wide. On Merryman's-lane bridge, where the iron truss was thoroughly cleaned and painted with Alcatraz paint; the ten (10) inch by ten (10) inch sills in the east approach were replaced by old (I) beams of iron from the yard, and a new floor. On Cedar-avenue bridge the floor at the east end was renewed with new three (3) inch plank, making the entire floor new, with what was laid in 1897. The old King truss on Slingluff-avenue bridge, south of North avenue, was replaced by old iron (I) beams from Belair Lot, and a new floor was laid.

The cost and character of work done on Annex bridges is shown on the list following city bridges.

VITRIFIED BRICK.

In connection with the paving of Twenty-third street it was decided to pave the intersection of Twenty-third and St. Paul streets with vitrified brick on six (6) inches of concrete. The bricks used were manufactured by Welsh, Gloninger, Maxwell Co., at Welsh Station, on the B. & O. R. R., and are what is known as the red shale iron vitrified brick. The cost of the work was as follows:

Concrete and laying brick, 267.5 square yards, at 75 cents....	$200 63
W. G. & M. vitrified brick, 16,000 at per M. $17.50.....	280 00
Hauling vitrified brick	17 00
	$497 63

MACADAM.

A petition signed by the property owners on Twenty-third street, between Guilford avenue and Hunter alley, asking that the macadam between those points be left and repaired. This was done at a cost to the owners of two hundred and eighteen dollars and eighty-three cents ($218.83), and eighteen dollars and ten cents ($18.10) to the city; a total cost of two hundred and thirty-six dollars and ninety-three cents ($236.93).

SEWER INLETS AT CHARLES AND TWENTY-FOURTH STREETS.

At Twenty-fourth and Charles streets two corner inlets were put in to relieve inlets at Twenty-third and Charles streets. The cost was: Labor, $195.41; material, $197.93; a total of $393.34.

FLAGSTONES, ANNEX.

A special appropriation of five hundred dollars ($500) was made for flagstones in the Annex. This amount was too small to cover the very large number of places where crossings are needed. In order to put in as many as possible a part of the old flagstone from Mt. Royal avenue were taken to the Annex and put in where most needed. The following list gives the location and cost of the work:

NEW FLAGSTONES IN THE ANNEX.

	Labor.	*Material.*	*Total.*
Linden avenue and Koenig street	$25 75	$44 18	$69 93
North and Second avenues	17 15	27 99	45 14
Roland avenue and St. Mary's street	1 72	13 52	15 24
Chestnut and First avenues	1 72	20 80	22 52
Chestnut and Second avenues	1 72	16 29	18 01
Chestnut and Potter avenues	1 72	19 80	21 52
Roland avenue opposite St. Mary's Church	1 71	25 73	27 44
Parkwood and Fulton avenues	29 31	20 48	49 79
Twenty-second street between Guilford avenue and Calvert street	38 13	62 62	100 75
Woodbrook and Fulton avenues	.....	6 60	6 60
Guilford avenue near Twenty-second street	17 03	26 55	43 58
			$420 52

OLD FLAGSTONES IN THE ANNEX.

	Labor.	*Material.*	*Total.*
Reservoir street east of Bolton street	$12 77	$2 50	$15 27
Franklin Terrace and Old York road	17 17	.....	17 17
Montebello and Belt avenues	16 98	.....	16 98
Chestnut and Third avenues	21 24	10 20	31 44
St. Paul and Twenty-seventh streets	12 87	1 50	14 37
Huntingdon and Cedar avenues	34 32	5 50	39 82
Huntingdon avenue and Twenty-seventh street	30 05	.....	30 05
Calvert and Twenty-fourth streets	21 47	.....	21 47
St. Paul and Twenty-third streets	15 50	.....	15 50
Old York road and Gorsuch avenue	8 58	.....	8 58
Wyanoke avenue and York road	12 87	4 00	16 87
Bolton and Reservoir streets	12 87	4 50	17 37
New Boundary and York road	12 88	2 50	15 38
Roland and Third avenues	52 45	.....	52 45
			$312 72

WOODBROOK AVENUE, PAVING AND FLAGSTONES.

Ordinance No. 73 directed the City Commissioner to pave a gutter on the northwest side of Fulton avenue, across Woodbrook avenue, also to pave back to the building line of Fulton avenue and place flagging across Woodbrook avenue. The appropriation was two hundred dollars ($200). The amount spent was: Labor, $75.03; material, $95.86; a total of $170.89.

GRADE ESTABLISHMENTS.

During the year original grade establishments were made on forty-nine (49) streets and re-establishments on twenty-one (21) streets. Owing to a lack of an authorized plan of streets in the Annex the system of grades for the Annex, which was to have been begun this year, made but little progress. One of the worst features of not having an official plan of streets in the Annex is that builders do not have the grade established before building on one side of the street, and the result is that when the grade is established a compromise must be made in the grade to save too great damages to the property.

An ordinance should be passed requiring the grades of the street to be established and conformed to before a building permit is issued either on a private or public street. The following lists show the streets on which the grades were established and re-established:

The amount expended out of the fund for grade establishments in the Annex was six hundred and eighteen dollars and fifty-four cents ($618.54).

GRADES ESTABLISHED DURING 1898.

Streets.	*From*	*To*
Alley	Third st.	Fourth st.
Beech avenue	Fourth st.	Sixth st.
Baltimore st.	Patuxent st.	Curley st.
Baltimore st.	Patapsco st.	Patuxent st.
Baltimore st.	Curley st.	Eastern city limits.
Canton ave.	Baltimore st.	Fayette st.
Chesapeake st.	Baltimore st.	Fayette st.
Chesapeake ave.	Liberty road.	Eleventh st.
Chestnut ave.	Liberty road.	Tenth st.
Collins ave.	Frederick ave.	Walrod st.
Eleventh st.	Clifton ave.	Beech ave.
Eleventh st.	Chesapeake ave.	Elm ave.
Federal st.	Gay st.	Collington ave.
Glyndon ave.	Stockholm st.	Carey st.
Harlem ave.	Tenth st.	Thirteenth st.
Hickory ave.	Fourth ave.	Fifth ave.
Hoffman st.	Milton ave.	Patapsco st.
Hudson alley.	Huntingdon ave.	Twenty-sixth st.
Hunter alley.	Twentieth st.	Twenty-first st.
Irving ave.	McHenry st.	Old Frederick road.

GRADES ESTABLISHED DURING 1898—Continued.

Streets.	*From*	*To*
Irvington ave	Frederick ave	Walrod st.
James st	Stockholm st	Carey st.
Kaye ave	Park Heights ave	Garrison ave.
Lewin ave	Kate ave. on east	Kate ave. on west.
Henry st	Randall st	Fort ave.
Oliver st	North ave	250 feet northerly.
Patapsco st	Eastern ave	Foster ave.
Patuxent st	Baltimore st	Fayette st.
Payson st	Lafayette ave	Lanvale st.
Payson st	Lafayette ave	Riggs ave.
Potomac st	Baltimore st	Fayette st.
Roland ave	Third ave	Fourth ave.
Roland ave	Fifth ave	Merryman's lane.
Sargent st	Stockholm st	Carey st.
Second st	North ave	Windsor Mill road.
Slingluff ave	North ave	Walbrook ave.
Stevenson st	Fort ave	Clement st.
Stockholm st	Glyndon ave	Columbia ave.
Stockholm st	Ward st	Nanticoke st.
Third st	North ave	Northwest st.
Twelfth st	Clifton ave	Beech ave.
Twenty-sixth st	Maryland ave	Oak st.
Twenty-sixth st	Hampden ave	Lake Roland Elev. R. of W.
Twenty-seventh st	Huntingdon ave	Hampden ave
Twenty-seventh st	Hampden ave	Mount Vernon ave.
Warner st	Ostend st	Haines st.
Wilkens ave	Brunswick ave	Southern city limits.
Windsor ave	Eighth st	Tenth st.
Windsor ave	Liberty road	Tenth st.

GRADES RE-ESTABLISHED DURING 1898.

Streets.	*From*	*To*
Baltimore st	Patuxent st	East ave.
Canton st	Baltimore st	Fayette st.
Chesapeake st	Baltimore st	Fairmount ave.
Chesapeake st	Fairmount ave	Fayette st.
Clifton ave	Tenth st	Twelfth st.
East ave	Baltimore st	Fayette st. (2).
Fairmount ave	Patapsco st	East ave. (2).
Fayette st	Patapsco st	East ave. (2).
Girard ave	Greenmount ave	Barclay st.
Hamburg st	Riverside ave	Federal Hill Park.
Lehman st	Millington lane	Brunswick st.
Payson st	Lafayette ave	Lanvale st.
Potomac st	Baltimore st	Fayette st.
Randall st	Covington st	Webster st.
32½ lane	Lehman st	Young st.
Tenth st	North ave	Beech ave.
Walbrook ave	Ninth st	Twelfth st.
Roland ave	Fourth st	Fifth st.

In connection with the use of the streets I would suggest that an ordinance should be passed requiring a permit from this office for all loads of over eight (8) tons, and that the ordinance regulate the width of tire to be used. The following is the scale of widths used in Philadelphia:

For loads from one-half (½) to three-quarter (¾) ton per wheel, tires to be not less than three (3) inches wide; from three-quarters (¾) to one (1) ton, tires to be not less than four (4) inches wide; loads from one (1) to two and one-half (2½) tons, tires to be not less than six (6) inches wide.

Where the tread of the front wheels is less than of the rear wheels a reduction of one (1) inch on the above width is allowed on loads of one (1) ton per wheel and over, and a fine of fifty ($50) dollars is imposed for violations of the ordinance.

This matter was brought up in the annual report of the City Commissioner for 1895 and should have attention.

Respectfully submitted.

O. W. CONNET,

Assistant City Commissioner.

Report of John S. Patterson, Assistant City Commissioner.

City Commissioner's Office,

Baltimore, January 1, 1899.

Mr. William W. Varney, City Commissioner:

Sir: I herewith respectfully submit a report of all work executed under my supervision and the direction of this office for the year ending December 31, 1898. The work placed in my charge embraced the repairing of all paved and unpaved streets in the city proper, the repairing of paved streets, wooden drain-boxes, stone culverts, the repairing, ditching, shaping up and macadamizing of roads, streets and lanes in the Annex; the supervision of the construction of the Chesapeake and Potomac Telephone Company's subway extentions, of the repairs and the construction of new electric street and steam railways in the city and Annex, and of the city storage lot.

REPAIRS OF RUBBLE-STONE PAVED STREETS.

As soon as these various works were assigned me, and before operations began, I first made a tour of inspection to every section of the city to ascertain the extent and carefully note the condition of streets and alleys in most need of repairs, so I would know where to place the repair gangs, in order to accomplish the most good and repair the worst streets as far as the funds appropriated for such would permit. I found the majority of the streets and alleys in a most deplorable condition, many of them unsafe, in fact, for travel over them. Some of them, I was informed, had not been repaired for ten, twelve and even twenty years. It was deemed prudent, therefore, to have those streets repaired as soon as possible to prevent accidents. Repair gangs were, accordingly, placed at those points, and on account of the numerous small and

unsound stones with which those streets had been paved, it was necessary to tear out the old stones from kerb to kerb and replace them with new and larger rubble paving stones.

In many of these places it was found that the paving stones had been laid upon a bed of clay and loam, without any sand whatever, for a foundation. In other places the condition was due to the defective repaving done by the Water Department and Gas Company over their respective mains and service supply pipes, and also by contractors over drain or sewer pipes. The imperfect and careless manner in which repaving had been done by corporations and individuals in the past, has, in a great measure, left all of our streets in the wretched condition in which we now find them.

It has been my constant effort all along to have all depressions in the pavement, over water, gas or drain pipes, no matter of how long standing, repaired by the rightful owners. Notifications of such places were sent out almost daily to the Water Department, Gas Company and owners of drain pipes, and, in consequence, a great many of these depressions in the pavements have been repaired. In making repairs in some streets, nearly fifty per cent. of the old stones, on account of the smallness of some and the disintegration of others, had to be replaced with new regulation stone. In such cases the cost of repairs was considerably increased. In nearly all of the rubble-stone paved streets repaired the gutter-stones were unfit for use, but, on account of the high price of new regulation gutter-stones and the limited funds with which to purchase any great quantity, the department was obliged to reset the old gutter-stones in many places in order to repave over as large a territory of streets as possible.

It will be observed, upon comparison with reports of rubble-stone repaving done in previous years, there is no difference in the cost of work done this year up to May 1, but from May 1 to December 31, the cost of repairs to paved streets is about one-third of one cent more per square foot. The reason of this increased cost is due to the fact that the last assembly of the Legislature passed a law making eight hours constitute a day's work for mechanics and laborers employed by the city and con-

tractors doing contract work for the city. There was no reduction made, whatever, in the rate of pay for mechanics and laborers. You will also observe that all new material, of whatever kind, used in the repairs of rubble-stone paved streets this year was contracted for, and that the prices ranged higher than those paid last year, which is another element of cost to be considered in the repairs done the past season. Taking into consideration the higher prices paid for material and the reduction of hours of labor for a day's work, I deem the cost of rubble-stone repaving reasonable and will compare very favorably with work of like character in previous years.

The following streets were repaired from kerb to kerb:

Lombard street from Broadway to Register street.
Chester street from Townsend street to North avenue.
Townsend street from Gay street to Port street.
Ashland avenue from Chester street to Washington street.
Chester street from Ashland avenue to Madison street.
Orleans street from Milton avenue to Montford avenue.
Biddle street from Jones' Falls bridge to Clifton avenue.
Lanvale street from Harford avenue to Eden street.
Exeter street from Gay street to Low street.
Preston street, south side, from Park avenue to Bolton street and from Bolton street to Linden avenue.
Whatcoat street from Patterson avenue to Presstman street.
Riggs avenue from Gilmor street to Bruce alley.
Greene street from Baltimore street to Pratt street.
German street from Greene street to Pine street.
Myrtle avenue from Waesche street to Franklin street.
Madison street from St. Paul street to Charles street.
Water street from South street to Calvert street.
Fremont avenue from Eutaw street to Barre street, and from Columbia avenue to Ramsey street and Pratt street to Baltimore street.
Hamburg street from Fremont avenue to China alley.
McCulloh alley from Lafayette avenue to Mosher street.
Stoddard alley from Etting street to Mosher street, and from Mosher street to Lafayette avenue.
McCulloh alley from Mosher street to McMechen street, and from McMechen street to Wilson street.
Jordan alley from Lanvale street to Dolphin street.
Jenkins alley from Wilson street to Laurens street.
Mason alley from McMechen street to Mosher street, and from Mosher street about 150 feet east.
Jordan alley from McMechen street to Wilson street.
Payson street from Ramsey street to Wilkens avenue.
Christian street from Payson street to Smallwood street.
Smallwood street from Christian street to Wilkens avenue.
Heath street from Charles street to Light street.
Randall street from Hanover street to Clarkson street.

The following streets were partly yet thoroughly repaired:

Exeter street from Low street to Baltimore street, and from Gay street to Hillen street.
Chestnut street from Gay street to Fayette street.
Low street from Forrest street to Rogers avenue.
Forrest street from Orleans street to Lexington street.
Rogers avenue from Gay street to Fayette street.
Painters Court, Canton avenue from Caroline street to President street.
President street from Canton avenue to Eastern avenue.
Eden street from Eastern avenue to Aliceanna street.
Eastern avenue from Central avenue to Wolfe street.
Hopkins avenue, intersection of Chase street.
Chase street from Hopkins avenue to Broadway.
McDonogh street from Chase street to Eager street.
Eager street from Broadway to Bond street.
Jefferson street from Broadway to Caroline street.
Rogers avenue from Lexington street to Baltimore street.
Rogers avenue from Lexington street to Low street.
Half Moon alley from Forrest street to Chesnut street.
Chesnut street from Gay street to Hillen street.
Chester street from Gough street to Canton avenue.
Bank street from Washington street to Chester street.
Eastern avenue from Chester street to Castle street.
Intersection of Collington avenue and Bank street.
Intersection of Gough street and Castle street.
Chester street from Ashland avenue to Eager street.
On Chester street, Patterson Park avenue, Hoffman street and Preston street the kerb around Collington Square was reset.
Ashland avenue from Washington street to Wolfe street.
Gough street from Broadway to Ann street.
Ann street from Gough street to Bank street.
Gough street from Caroline street to Eden street.
Ann street from Canton avenue to Bank street.
New kerb and gutter on Bank street from Broadway to Register street.
North side of Pine street from Mulberry street to Franklin street.
Preston street from Linden avenue to Madison avenue.
Intersection of Park avenue and Camel alley.
Howard street from Centre street to Franklin street.
North avenue from Oak street to Marylaud avenue.
Mason alley from Dolphin street to Lanvale street, and from Lanvale street to Lafayette avenue.
Around Park, intersection Linden and North avenues.
Linden avenue from North avenue to Wilson street.
Foster street from Mosher street to McMechen street.
McMechen street from Linden avenue to Mason alley.
Wilson street from Bolton street to Jenkins alley.
Laurens street from Jenkins alley to Bolton street.
Gutters on John street from Wilson street to McMechen street.
Biddle street from Pennsylvania avenue to Madison avenue.
Pear street from Biddle street to Union street.
McCulloh street from Lanvale street to McMechen street.
Lanvale street from Madison avenue to Druid Hill avenue.

Druid Hill avenue from Lafayette avenue to Mosher street.
Argyle avenue from Dolphin street to Smith street.
Lanvale street from Pennsylvania avenue to Argyle avenue.
Dolphin street from Pennsylvania avenue to Myrtle avenue.
Mosher street from McCulloh street to Etting street.
Etting street 100 feet east of Mosher street.
Central avenue from Eastern avenue to Canton avenue.
Caroline street from Bank street to Central avenue.
Bond street from Bank street to Central avenue.
Spring street from Bank street to Central avenue.
Dallas street from Bank street to Central avenue.
Bethel street from Bank street to Canton avenue.
Register street from Bank street to Canton avenue.
Intersection of Caroline and Lanvale streets.
Lanvale street from Eden street to Bethel street.
Federal street from Eden street to Bethel street.
Oliver street from Eden street to Hopkins avenue.
Preston street from Harford avenue to Aisquith street.
Lamont avenue from Lanvale street to Aisquith street.
Caroline street and Hoffman street at St. Joseph's Hospital.
Dallas street from Townsend street to Lanvale street.
Bethel street from Townsend street to Lanvale street.
Pratt street from Ann street to Central avenue.
Spring street from Fairmont avenue to Gough street.
Dallas street from Baltimore street to Gough street.
Lombard street from Bond street to Caroline street.
Register street from Pratt street to Bank street.
Eden street from Lombard street to Gough street.
Caroline street from Lombard street to Gough street.
Lanvale street from Chester street to Wolfe street.
Chester street from Townsend street to Oliver street.
Townsend street from Chester street to Collington avenue.
Lombard street from Register street to Ann street.
Register street from Baltimore street to Pratt street.
Biddle street from Clifton avenue to Greenmount avenue, and from Jones' Falls bridge to Maryland avenue.
Holliday street from Baltimore street to Centre street.
Morton alley from Biddle street to Preston street.
Guilford avenue from Biddle street to Chase street.
Eager street from Guilford avenue to McKim street.
McKim street from Eager street to Ashland avenue.
Madison street from Greenmount avenue to Harford avenue.
Intersection of Madison and Ensor streets.
Barclay street from Chase street to Biddle street.
Clifton Place from Biddle street to Eager street.
Forrest Place from Chase street to Biddle street.
Orleans street from Montford avenue to Patterson Park avenue.
Fayette street from Milton avenue to Patterson Park avenue.
Edgar Place from Fairmount avenue to Orleans street.
Jefferson street from Patterson Park avenue to Chester street.
Chester street from McElderry street to Orleans street.
Montford avenue from Orleans street to Fayette street.
Patterson Park avenue from Jefferson street to Fayette street.
Milton avenue from Fayette street to Orleans street.
Smith street from Pennsylvania avenue to Argyle avenue.

Shields alley 100 feet north of Dolphin st.
Payson street from Ramsey street to McHenry street.
Intersection of Ramsey and Pulaski streets.
McHenry street from Payson street to Monroe street.
Ramsey street from Payson street to Pulaski street.
Union street from Druid Hill avenue to Pennsylvania avenue.
Presstman street from Pennsylvania avenue to Druid Hill avenue.
Druid Hill avenue from St. Mary's street to Preston street.
Moore street from Druid Hill avenue to Elder alley.
Orchard street from Druid Hill avenue to Tessier street.
King street west of Fremont avenue.
Dawson alley from Pratt street to McHenry street.
Dover street from Dawson alley to Fremont avenue.
Hughes street from Light street to foot of street.
Belt street from Cross street to West street.
Covington street from Hughes street to Montgomery street.
Warren avenue from Williams street to Battery avenue.
Intersection of Battery and Warren avenues.
Intersection of Battery avenue and Hamburg street.
Church street east of Light street.
Montgomery street from Covington street to water front.
Hanover street from Fort avenue to Randall street.
Intersection of West and Charles streets.
Randall street from Clarkson street to Race street.
Clarkson street from Fort avenue to Heath street.
Heath street from Race street to Hanover street.
Durst alley near Cross street.
Riverside avenue near Cross street.
Olive street from Heath street to Randall street.
Dover street from Greene street to Paca street.
Greene street from Paca street to Conway street.
German street from Pine street to Fremont avenue.
Howard street from Barre street to Cross street.
Lee street from Howard street to Light street.
Reese alley from Lee street to York street.
Barre street near Sharp street.
Stump alley from Barre street to Conway street.
Dover street from Howard street to Eutaw street.
Riggs avenue from Bruce street to Fulton avenue.
Mount street from Riggs avenue to Lafayette avenue.
Mosher street from Fulton avenue to Gilmor street.
Edmondson avenue from Fulton avenue to Gilmor street.
Stricker street from Riggs avenue to Winchester street.
Mulberry street from Stricker street to Calhoun street.
China alley from Fremont avenue to Hamburg street.
Ramsey street from Fremont avenue to 100 feet west.
Cheapside from Water street to Lombard street.
South street from German street to water front.
Bank lane from Charles street to Calvert street, and west of Charles street.
Frederick street from Pratt street to Baltimore street.
St. Paul street from Baltimore street to Saratoga street.
North street from Lexington street to Madison street.
Holliday street from Pleasant street to Madison street.
Charles street opposite Pleasant street.

Howard and Lexington streets.
Bowleys' Wharf from Pratt street to Cable street.
Franklin street from North street to Davis street.
Madison street from Jones' Falls to St. Paul street.
Scott street from Ramsey street to McHenry street.
Wyoming street from Crooked lane to Little Sharp street.
Little Sharp street from Wyoming street to Lexington street.
Hull street from Nicholson street to water front.
Haubert street from ferry to Nicholson street.
Haubert street east of Fort avenue.
Smith's wharf.
McElderry's wharf from Pratt street to dock.
Water street from Gay street to Centre Market.
Clay street from Park avenue to Liberty street.
Intersection of Liberty and Clay streets.
Clay street from Liberty street to Little Sharp street.
Marion street from Howard street to Eutaw street.
Paca street from Fayette street to Saratoga street.
Fayette street from Eutaw street to Paca street.
Holliday street from Baltimore street to Fayette street.
Fayette street from Holliday street to Gay street.
Guilford avenue from Biddle street to Preston street, and Chase street to Eager street.
Hillman street from Preston street to Hoffman street.

Small repairs made in the following streets by floating gangs:

York street.
Cross and Howard streets.
Sharp street.
Scott street.
Ramsey and McHenry streets.
Lee and Light streets.
Madison street.
Eager street.
Chase street.
Curley street.
O'Donnell street.
Ashland avenue.
McDonogh street.
Hopkins avenue.
McElderry street.
Chapel street.
Bank street.
Race street and Foster avenue.
Hudson street.
Jefferson street.
Caroline street.
Lancaster street.
Bond and Thames streets.
Exeter street.
Aliceanna street.
Little Gough street.
Jenkins alley north of Lafayette avenue.
Morris alley north of McMechen street.

Stoddard alley north of McMechen street.
McMechen street and Argyle avenue.
Greenwillow street.
Argyle avenue and Biddle street.
Pierce street.
Ogsden street.
Appleton street.
Friendsbury and Presburry streets.
Kimble alley, Patterson avenue.
Pine street.
West street.
Fulton avenue.
Eutaw street.
Sharp street.
Spring Garden avenue.
Belair Market.
Gay and Madison streets.
Front street.
Eastern avenue.
Rogers avenue.
Low street.
College alley.
Saratoga and Pleasant streets.
Tyson street.
Clay street.
Water street.
Monument street.
Howard street.
Frederick and Lombard streets.
Light and German streets.
Cathedral and Howard streets.
Charles and Preston streets.
Lafayette avenue and St. Paul street.
Lanvale street and Guilford avenue.
Calvert street.
North street.
Preston street.
Albemarle street.
Trinity street.
Gough street.
Central avenue.
Watson street.
Cable street.
Foster and Race streets.
Montford avenue.
Scott street.
Boston street.
Port street.
Fait avenue.
Luzerne street.
Eutaw street.
Franklin street.

Vincent alley.
Schroeder street.
Lexington street.
Pearl street.
State street.
Iceland street.
Barre street.
Rice street.
Presbury street.
Vincent alley.
Stockton alley.
Postoffice avenue.
Little Sharp street
Garrett street.
Fayette street.
St. Paul street.
Hull street.
Henry street.
Duncan alley.
Preston street.
St. James street.
Eager street.
Lombard street.
Maryland avenue and Falls road.
Eutaw and Lexington streets.
A fender stone was planted in northeast corner Calvert and Madison streets.

Below is a statement of amount, character, and material used, and cost of repairs done from January 1, to May 2, 1898:

142 cubic yards sand	$52 45	
46 cubic yards cinders	18 40	
56.57 perches of rubble paving-stone	85 98	
490 lineal feet new gutter-stones	102 90	
Expended for material	$259 73	
Expended for labor	2,762 52	
Total cost of labor and material		$3,022 25

65,258 square feet rubble stone repaving at .0291	$1,905 43
9,996 square feet Belgian block repaving at .04½	449 82
1,943 square feet old flagstone reset at .10	194 30
490 lineal feet new gutter-stone set at .05	24 50
3,120 lineal feet old gutter-stone reset at .05	156 00
1,736 lineal feet old kerb reset at .10	173 60
349 square feet old Asphalt block repaving at .04½	15 70
490 lineal feet new gutter-stone at .21	102 90

This work was done at the rate of 9 hours' labor for a day's work.

Below is a statement of amount, character, materials used, and cost of repairs done from May 2, to December 31, 1898:

10,660 cubic yards sand	$5,944 10	
3,583.97 perches rubble paving-stone	5,814 87	
2,406½ lineal feet new gutter-stones	585 30	
300¾ lineal feet new 5-inch kerb	165 65	
232 lineal feet new 4½-inch kerb	104 21	
27 lineal feet new 4½-inch kerb circle	24 23	
Expended for material	$12,638 36	
Expended for labor	42,990 66	
Total cost of labor and material		$55,629 02
1,483,037 square feet rubble-stone repaving at .0306		$45,427 84
72,439 square feet Belgian block repaving at .04½		3,259 75
19,843 square feet old flagstones reset at .10		1,984 30
2,406½ lineal feet new gutter-stone set at .05		120 32
52,612 lineal feet old gutter-stone reset at .05		2,630 60
300¾ lineal feet new 5-inch kerb set at .10		30 08
232 lineal feet new 4½-inch kerb set at .10		23 20
27 lineal feet new kerb circle set at .20		5 40
11,854¼ lineal feet old kerb reset at .10		1,185 42
1,407 square feet old Asphalt block repaving at .04½		63 32
255 square feet brick repaving at .08		20 40
Cost of new gutter and kerb		879 39
This work was done at the rate of 8 hours' labor for a day's work.		
Cost of making approaches and repaving floor of barn for the Street Cleaning Department		325 25
The amount of repaving at nine hours per day would have been 1,647,819 square feet, at a cost of .0275 cents per square foot.		
Total amount of repaving done for the year 1,548,295 square feet.		
Cost per square foot for eight and nine hours' work per day, combined equal, .0305 cents.		
Granite gutters 3 feet wide in place across Eager, Madison and Milliman streets, east side of Broadway		184 49
Material on hand paid for but not used:		
400 linear feet gutter-stone	$96 00	
33 cubic yards sand	18 15	
		114 15
Expended for inspection, etc.		1,831 50
" " lumber, coal, etc., used at storage lot		59 30
" " hardware and tools		450 61
" " oils and cement		124 99
" " hauling and incidentals		64 13
		$61,805 69

Expended for cross streets but included in amount for repairs of paved street as follows:

Labor	$1,980 26	
Material	1,664 49	
		$3,644 75

Expended for livery and transportation $426 40

REPAIRS TO UNPAVED STREETS.

No extensive repairs to unpaved streets could be made in the city on account of the small appropriation available.

Appropriation		$3,000 00
Expended for labor	$767 80	
Expended for materials, etc.	690 04	
		1,457 84
Balance		$1,542 16

Repairs made are as follows:

Ferry Bar from Light Street Bridge to Marshall avenue was shaped up, gravelled and a new wooden box culvert constructed across the road near Marshall avenue.

Cost—Labor	$165 14	
Material	22 68	
		$187 82

Loney's lane from P. W. & B. R. R. to Sinclair's lane was put in thorough repair as regards ditching, shaping up, stoning the worst places, widening the roadway and constructing stone bulkhead.

Cost—Labor	$436 96	
Material	6 60	
		$443 56

Bowly's lane from Belair road to eastern city limits and Sinclair lane from Belair road to Loney's lane were repaired and macadamized by Geo. Brehm, contractor.

Contract price		$250 00

Leadenhall street from Stockholm street to a point about 100 feet south of B. & O. R. R., repaired with shells.

Cost—Labor	$2 50	
Material	59 02	
		$61 52

Warner street from Ostend street to Bayard street, repaired in places with shells.

Cost—Labor	$3 33	
Material	89 32	
		$92 65

Bayard street from Warner street to B. & O. R. R., repaired in places with shells.

Cost—Labor	$2 50	
Material	74 55	
		$77 05

Philadelphia road from Lakewood avenue to Chesapeake street, repaired with shells.

Cost—Labor	$15 67	
Material	9 30	
		$24 97

A wooden box 80 feet long was constructed across Warner street south of Ostend street.

Cost—Labor	$46 29	
Material	26 90	
		$73 19

Washouts at Lowman street and Fort avenue.
Baltimore street near eastern city limits.
Gravelling Marshall avenue, south of West street.
Gravelling Pinckney street near Cross street.
Wooden drain box repaired at Howard and Ostend streets.
Intersection of Baltimore and Patapsco streets macadamized.

Expended for places above, including labor, materials and incidentals, two hundred and forty-seven dollars and eight cents ($247.08).

FLAG AND STEPPING-STONES.

Appropriation for flag and stepping-stones, Ordinance No. 34, 1898.—$1,500.00.

In my branch of the department the expenditures were as follows:

For labor	$496 85
For materials	338 23

Location of new rows in place, including cost of labor and material.

	Labor.	*Material.*	*Total.*
Across Preston street, west side Chester street	$25 38	$50 21	$75 59
" Washington street, south side Ashland avenue	22 24	56 20	78 44
" Caroline street, south side Fayette street	33 95	63 50	97 45
" Light street, south side Heath street	17 50	37 60	55 10
" Dillon street, west side Canton street	28 00	55 70	83 70

At the following crossings old flagstones from Mt. Royal avenue were used with new stepping and gutter-stones:

	Labor.	*Material.*	*Total.*
Across Chase street, west side Hopkins avenue	$30 85	$4 18	$35 61
" Payson street, south side Christian street	14 85	11 61	26 46
" Pulaski street, south side Ramsay street	11 99	11 43	23 42
" Ramsay street, east side Pulaski street	18 57	11 45	30 00
" McCulloh street, south side McMechen street	14 83	12 37	27 20
" Windsor avenue, west side Stricker street	22 00	12 05	34 05
" Harford avenue, south side Lanvale street	23 50	1 92	25 42
" Harford avenue, north side Lanvale street	23 50	1 93	25 43
" Monument street, west side Central avenue	29 00	.....	29 00

Repairs to flagstones were made at the following points:

Harlem avenue and Calhoun street.
Light and Little Church streets.
Light and Montgomery streets.
Light and Hughes streets.
Light and Hamburg streets.
Light and Barre streets.
Light and Hill streets.
Clement and Hamburg streets.
Fayette and Castle streets.
Caroline street and Fairmont avenue.
Fayette street, west side Caroline street.
St. Paul and Hamilton streets.
Baltimore street, east of Charles.

Single row across Woodyear street, north side Lanvale street.
Expended for above repairs..... $188 21

Repairs were made to flagrows at the following points and charged to the repairs of paved streets:

Centre and Hargrove alley.
Baltimore and Gay streets.
Water and South streets.
Eutaw street, north of New street.
Baltimore street, between Calvert and Light streets.
Expended for same..... 25 46

REPAIRS OF IMPROVED STREETS.

The repairs made upon improved or asphalt block and sheet asphalt paved streets were done by contract (with the exception of some small patching, which was done by day's labor), and under direction of the City Commissioner's Department.

The repairs to asphalt block paved streets were done by the Maryland Pavement Company, and consisted of old and new work. Wherever the old blocks were found to be too much worn or disintegrated, new blocks were substituted, and such of the old blocks as were fit for use were taken up, thoroughly cleaned and relaid, with the worn side down and upon a bed of clean and sharp sand leveled to the proper grade and contour of the street. The most extensive repairs were made to the pavements of Lafayette avenue from Eutaw Place to Fulton avenue, and of Lexington street from Poppleton street to Fulton avenue, as these highways, in many places, were in a deplorable condition and almost impassable. Only slight repairs were made on the following asphalt

block paved streets, viz: Eutaw Place from Madison street to Dolphin, and from McMechen to Wilson street; Charles street from Read to Chase street; streets around the Northeast Market; streets along the Fish Market east of Centre Market Space; Saratoga street near Greene street, and St. Paul street.

A statement giving the total number of square yards of old and new work done, with the number of new blocks used upon each street or avenue and the cost of same is as follows, viz:

Lafayette avenue:		
3,081.24 square yards old work at $1.10.....	$3,389 37	
1,326.24 square yards new work at $1.00.....	1,326 24	
33,594 new blocks at 6½c.....	2,183 63	
Total expended.....		$6,899 24
Lexington street:		
3,172.93 square yards old work at $1.10.....	$3,490 23	
2,373.26 square yards new work at $1.00.....	2,373 26	
60,542 new blocks at .06½c.....	3,935 25	
Total expended.....		$9,798 74
Eutaw Place:		
104.85 square yards old work at $1.10.....	$115 34	
161.05 square yards new work at $1.00.....	161 05	
4,273 new blocks at .06½c.....	277 73	
Total expended.....		554 12
Charles street:		
53.30 square yards old work at $1.10.....	$58 63	
144.49 square yards new work at $1.00.....	144 49	
3,667 new blocks at .06½c.....	238 35	
Total expended.....		441 47
Streets at Northeast Market:		
26.24 square yards old work at $1.10.....	$28 86	
4.00 square yards new work at $1.00.....	4 00	
100 new blocks at .06½.....	6 50	
Total expended.....		39 36
Streets along Fish Market, east of Centre Market Space:		
8.22 square yards old work at $1.10.....	$9 04	
16.52 square yards new work at $1.00.....	16 52	
421 new blocks at .06½.....	27 36	
Total expended.....		52 92
Saratoga street near Greene street:		
8.96 square yards old work at $1.10.....	$9.85	
Total expended.....		9 85
Bill of labor for repairing over drain-pipe on St. Paul and Lanvale streets.....		17 25
		$17,812 95

Upon all asphalt block pavements under a guarantee, no repairs were made during the year, except a few small patches on Fulton avenue and on the west driveway of Eutaw Place north of Lanvale street. Messrs. Jones, Pollard & Co., contractors for same.

SHEET ASPHALT PAVEMENTS.

During the early part of the year, repairs to the following streets paved with sheet asphalt were made by the Southern Asphalt Paving Company, and by the direction of Mr. L. F. Lewis, ex-City Commissioner.

Calvert street from Read street to Mt. Royal avenue, 82.8 square yards, at $3.50	$289 80
Fayette street from Calvert to North street, 31.15 square yards, at $3.50	109 03
Holliday street from Fayette to Lexington street, 56.05 square yards, at $3.50	196 18
Lexington street, north side from Calvert to North street, 10.26 square yards, at $3.50	35 90
Lexington street or plaza from Holliday to Gay street, 33.20 square yards, at $3.50	116 20
Fayette from North to Holliday street, 15.25 square yards, at $3.50	53 37
Intersection Holliday and Lexington streets, 8.40 square yards, at $3.50	29 40

The character of work done consisted in the cutting out and removal of the disintegrated topping in patches, and the resurfacing of these places with 1½-inch binder and 1½-inch topping. The same company late in the year did a little patching on streets around the City Hall.

Holliday, Lexington and North streets:			
79.44 square yards binder and topping, at	$1 75		$139 11
40 square yards old material removed, at	20		8 00
Calvert, between Read and Mt. Royal avenue:			
16.14 square yards binder and topping, at	$1 75	$28 24	
9.14 square yards old material removed, at	20	1 83	
			30 07
Source of payments { Repairs to paved streets.		$761 15	
Source of payments { In front of city property.		245 91	
			$1,007 06

SHEET ASPHALT PAVED STREETS.

For general repairs to streets paved with sheet asphalt a contract was given Mr. Isaac S. Filbert by Mr. L. F. Lewis, ex-City Commissioner. The work mostly consisted in the cutting out and removal of the disintegrated asphalt topping in patches in various sizes, and the covering then with binder 1½ inches and topping 1½ inches. All asphalt pavements around markets, with the exception of the Cross Street, Hanover and Belair Markets, were also repaired. No repairs were required on the streets abutting the Cross and Hanover Street Markets. The roadways on either side of the Belair Market are very much in need of an entirely new pavement. All the holes in the asphalt and concrete pavements were filled in and paved with cobblestones. The driveway east of the Centre Market from Baltimore street to the south side of Water street, and that on the west side from Baltimore street to the north side of Water street, were entirely resurfaced. The belgian block toothings along the gutters were raised and cemented, and all the cobblestones, in patches, were removed, the surface of the streets cleaned and all depressions in the pavement filled in with binder varying from 1½ to 4 inches, upon this a surface of topping 1½ inches was placed. All the sheet asphalt pavements are now in good condition and should not require much repairs for the year 1899. Upon the guaranteed pavements only slight repairs were made, and those were on Lexington street between Holliday and North streets, and done by the Southern Asphalt Paving Company.

A statement is given below of the streets repaired, also granolithic gutters and other work done by Mr. Filbert:

Broadway from Canton avenue to south side Preston street	1303.50	sq. yds.
Centre Market from Baltimore street to Lombard street	2903.27	" "
Front street from Baltimore to Gay street	60.00	" "
Chase street from Broadway to Guilford avenue	112.73	" "
Mulberry street from Charles to Howard street	16.40	" "
Little Montgomery street in front of old Southern Police Station	214.33	" "
Streets around Lafayette Market	125.32	" "
Calvert street from Read street to Mt. Royal avenue	88.12	" "
Streets around Richmond Market	186.37	" "
Hollins street from Poppleton street to and along Hollins Market	1049.03	" "
Baltimore street from Broadway to Patterson Park avenue	79.11	" "
	6138.18	" "

GRANOLITHIC GUTTERS.

Broadway from Patterson Park avenue to Preston street	160.80	sq. yds.
Baltimore street from Broadway to Patterson Park avenue	7.65	" "
Mulberry street from Howard street to Charles street	6.47	" "
Saratoga street	4.94	" "
Richmond Market	6.65	" "
Camden street to Camden lane	1.72	" "

VITRIFIED BRICKS.

Broadway from Baltimore street to Fairmont avenue..... 12.33 sq. yds.

SCORIA BLOCKS.

Pennsylvania avenue at Lafayette Market..... .....120.20 sq. yds.

RESETTING OLD FLAG STONES.

Pennsylvania avenue at Lafayette Market.....116.03 sq. ft.

Granolithic gutters were repaired on the following streets by day's labor:

Calvert and Biddle streets, labor and material.....		$2 08
Lafayette avenue and Wilmer alley;		
Lafayette avenue near Norris alley;		
Lafayette avenue west of Gilmor street;		
Saratoga street between Pearl and Arch streets—		
Labor.....	$23 08	
Material.....	7 95	
		$31 03
On Saratoga street east and west of Howard street, repairs were made by Isaac S. Filbert, contractor, 27.51 square feet at forty cents.....		$11 00

Source of payments; repairs of paved streets.

NOTE.—Only three thousand four hundred and fifty-nine dollars and twenty cents ($3,459.20), representing 1,153.07 square yards at $3 per square yard, were paid Mr. Filbert, contractor, for work done upon repairs to sheet asphalt pavements.

BELGIAN BLOCK PAVED STREETS.

No repairs to Belgian block paved streets were done the past season except a few small patches.

For the coming season considerable repairs will be required upon the following streets, viz: Baltimore street between Central

and Fremont avenues; Calvert street between Baltimore and Monument streets; Pratt street between Jones' Falls bridge and Paca street; Eutaw street between Baltimore and Madison streets, and Light street between Pratt and Lee streets. This latter street is in a deplorable condition and will require to be renewed with new blocks for the greater part, in fact it ought to be entirely repaved and upon a concrete base.

ANNEX.

Out of this appropriation—$25,000.00—to which add $1,900.00 transferred from "grade establishments" account, for the repairs of roads,. bridges, streets, etc., in the Annex, there was expended under my direction $14,101.58, of which $8,158.57 was for labor and $5,943.01 was for material. The following paved streets were repaired: Gorsuch avenue from Harford road to Harrison street, St. Paul street east side of street railway tracks from North avenue to Twenty-first street, Twentieth street from St. Paul street to Guilford avenue, Guilford avenue from Twenty-first street to Twenty-second street, Calvert street from Twentieth street to Twenty-first street, Lovegrove alley from Twenty-first street to Twenty-second street, intersection of Charles and Twenty-fourth streets, Wilkins street from Frederick road to the north side of Lombard street, north side of Baltimore street from Calverton road to northeast branch of Gwynn's falls, and south side of Baltimore street from Catherine street to Garrison lane, intersection of Baltimore street and Garrison lane, east side of Fulton avenue from Pennsylvania avenue to Mary street, and west side from Mary street to Francis street, Pennsylvania avenue from Fulton avenue to Retreat street, and Francis street from Fulton avenue to Clifton avenue.

Gutters were paved at the following streets: Brunswick street south side of Frederick avenue; in front of engine house on Brunswick street and on the east and west approaches of Wilkens avenue bridge; Loudon avenue west side of Millington lane; on Caton avenue from run near Blode's factory north to about 250 feet; on old Frederick road about a distance of 60 feet; Stafford street east side of Caton avenue; Braddish avenue south side of

North avenue; Walbrook avenue west side of Slingluff avenue; Seventh street south side of Walbrook avenue; north side of North avenue near Tenth street; Thomas avenue south side of North avenue; Frisby street south side of Oxford avenue; also Frisby street opposite ten-foot alley south of Oxford avenue; Barclay street south side of Waverly avenue; Druid avenue intersection of David avenue, and Fifth avenue south side of North avenue.

The stone gutter across Merryman's lane west of Charles street was raised and repaved and a gutter constructed across Twenty-second street intersecting with Hudson alley.

Below is a statement showing amount, character, material used and cost of repairs of paved streets.

1,882½ lineal feet new gutter stone	$392 28
44 lineal feet new 5-inch kerb	24 20
378 cubic yards sand	205 15
216.06 perches rubble paving stone	338 43
Amount expended for material	$960 06
Amount expended for labor	2,115 33
Total expended for labor and material	$3,075 39
73,805 square feet rubble stone repaving at .0298	$2,204 58
1,882½ lineal feet new gutter set at .05	94 13
44 lineal feet new 5-inch kerb set at .10	4 40
4,685 lineal feet old gutter reset at .05	234 35
1,028 square feet old flagstones reset at .10	102 80
125 lineal feet old kerb reset at .10	12 50
150 square feet Belgian block repaving at .04½	6 75
Expended for new gutter stone and kerb	416 48

These repairs were done at the rate of eight hours' labor for a day's work.

Flagstones obtained from Mt. Royal avenue were placed at the following cross streets and charged to account repairs streets, roads and bridges, etc.:

A double row across Twenty-first street west side Guilford avenue.
" " " " Charles street north side Twenty-fourth street.
" " " " Twenty-fourth street west side of Charles street.
A single row " alleys between North avenue and Twentieth street east side Guilford avenue.
A single row across alleys between Twentieth and Twenty-first streets and east side Guilford avenue.
A single row across alley between Twentieth and twenty-first streets and west side of Guilford avenue.

The old stone culvert across the Hillen road near the new city limits was torn out on account of its unsafe condition and replaced by one constructed of brick. It consists of side walls nine inches thick rising to a height of one foot six inches from the bottom. Upon these walls an arch nine inches thick and with a radius of one foot six inches is built and well backed up with rubble stones. The bottom is paved with brick on edge and laid upon a stone foundation. The pavement is depressed three inches in the centre, making the height three feet three inches and the width three feet. The length is 27 feet.

Expended for labor	$68 63
Expended for material	160 86
	$229 49

The old culvert across Reese street south of Friendship street, which consisted of stone sidewalls with a plank floor covering, was in such a deplorable condition that it was necessary to tear down the old walls and reconstruct them, as most of the old stone was rotten and disintegrated. After the walls were rebuilt new joists of Georgia pine lumber were imbedded in the walls and a new flooring of Georgia pine lumber placed upon them.

Expended for labor	$85 63
Expended for material	52 60
	$138 23

Wilkens avenue from Brunswick street to the southern city limits was graded, shaped up and then macadamized with crushed stone. For a distance of 1,100 feet eastwardly from the city limits the road was macadamized to a width of 24 feet and a depth of 6 inches. The remaining distance, about 1,800 feet, was dressed with crushed stone to a width of 20 feet and a depth of four to five inches.

Expended for labor	$ 59 16	
" " material	592 55	
		$651 71

Brunswick street from the Frederick road to Lehmon street was shaped up, gutters deepened and cleaned out, and crushed stone

placed upon it to a width of 18 feet and a depth of about 6 inches. From Lehmon street to Wilkens avenue, a dressing of crushed stone was put on in patches.

Expended for labor	$31 67	
" " material	224 25	
		$255 92

Millington lane from the Frederick road to Wilkens avenue received a light dressing of crushed stone.

Expended for labor	$2 25	
" " material	51 75	
		$54 00

Garrison lane from the Frederick road to Edmondson avenue was shaped up, ditches cleaned and dressed with crushed stone wherever required.

Expended for labor	$31 17	
" " material	94 15	
		$125 32

The Calverton road for a distance of 600 feet southeast from Franklin street was thoroughly macadamized with crushed stone to a width of 18 feet and a depth of 6 inches. The road northwest of the northeast branch of Gwynn's Falls was dressed with crushed stone for a distance of about 250 feet to a width of 14 feet and a depth of 5 inches. The balance of the road from the falls to Hollins street received a dressing of crushed stone wherever required.

Expended for labor	$45 92	
" " material	226 62	
		$272 54

Caton avenue was ditched, graded and macadamized from Maiden's Choice run to Stafford street, and the wing-walls, on east side of stone culvert over run above mentioned, repaired and extended.

Expended for labor	$246 01	
" " material	80 12	
		$326 13

Lafayette avenue from the B. & P. R. R. to Florence street was graded, gutters cleaned out and macadamized where most needed.

Expended for labor	$136 33	
" " material	63 76	
		$200 09

Edmondson avenue—For a distance of about 200 feet the gutters were cleaned, some washouts filled in, and a few bad depressions in the bed of the avenue filled in with crushed stone.

Expended for labor	$26 66	
" " material	10 68	
		$37 34

Jenkins' lane was graded, ditches cleaned out, stoned in places and drain-box repaired.

Expended for labor	$235 56

Gorsuch avenue—All the gutters along this avenue were opened and cleaned, the bed of the road shaped up, drain boxes repaired and some stone placed in the worst places.

Expended for labor	$288 25

Merryman's lane was put in good repair from Sumwalt's run to Falls road. The ditches on either side were deepened in many places and cleaned out; the bed of the road shaped up, stoned and graveled in many places. That portion of it west of Charles street for a distance of 700 feet was thoroughly repaired with broken stone and fine gravel as a top dressing.

Expended for labor	$616 88	
" " material	90 00	
		$706 88

The wooden sewer in Merryman's avenue, from the York road to Barclay street, was repaired, and an extension built across Barclay street to the west side.

Expended for labor	$256 21	
" " material	56 27	
		$312 48

WEST ARLINGTON.

Resolution No. 78, of 1898, appropriated $1,000, to be taken out of the appropriation of $25,000 for the repairs of roads, streets, bridges, etc., in Annex, to macadamize Forrest avenue from the Liberty road to the western city limits.

Work done by Mr. Charles A. Hook, Contractor.

Appropriation	$1,000 00
Expended	1,000 00

Forrest avenue—On account of bad condition of this avenue it was necessary to repair and further macadamize it for a distance of 740 feet.

Expended for material..... $628 25

Fairview avenue—Crushed stone was placed on this avenue where most needed.

Expended for material..... $112 83

Garrison avenue—Crushed stone was placed on this avenue where most needed.

Expended for labor.....	$10 00	
" " material.....	254 80	
		$264 80

Springdale avenue—A dressing of crushed stone was placed on the worst parts of this avenue.

Expended for material $213 43

Calloway avenue received a dressing of crushed stone where most needed.

Expended for material..... $254 31

Springfield avenue—Crushed stone was spread in places on this avenue where most needed.

Expended for material..... $155 67

Oakfield avenue was repaired in a few places with crushed stone.

Expended for material..... $31 98

Kate and Cleveland avenues were repaired in a few places with crushed stone.

Expended for material..... $27 60

North avenue between Slingluff avenue and Seventh street received a dressing of crushed stone.

Expended for labor.....	$10 00	
" " material.....	159 56	
		$169 56

The crushed stone used to repair the above-mentioned avenues is known as nigger-head stone, the hardest and most durable of Gabbro or nigger-head stone for macadamizing roads. It was furnished by Mr. Chas. A. Hook, of West Arlington.

Two cellars in the bed of Hollins street, west side of Calverton road were filled in with dirt, and the two water-closets in the rear of lot were first cleaned out and then filled in with dirt. This is city property, and the work was done by Mr. P. Walsh, contractor.

Expended for labor	$9 17	
" " material	70 00	
		$79 17

A 15-inch terra-cotta drain-pipe fifty feet long was laid across Harrison street in line of alley north of Gorsuch avenue to replace wooden drain-box that had partly rotted away and caved in. Pipe used from city lot.

Expended for labor	$50 00

Wing walls to bridge across Mine Bank lane, north of Belt Line Railroad, repaired and partly rebuilt.

Expended for labor	$58 08	
" " material	4 56	
		$62 64

Carroll avenue east from the old York road to its terminus was put in thorough repair by grading, shaping up, straightening and cleaning out gutters.

Expended for labor	$246 75

Wyanoke avenue east from the old York road was graded, shaped up and gutters cleared out.

Expended for labor	$91 67

Washouts occurred at the following points, some of them having been repaired and filled in twice, viz: On Wilkens avenue east side of bridge over Gwynn's Falls. There are two inlet openings about fifty feet east of the bridge, on either side of the roadway which are entirely inadequate to accommodate all the drainage concentrating at this point in times of heavy rains, and, in consequence of which, the water rises until it overflows and cuts away the embankment on each side of the road; on Calverton road opposite the Wenstrom Mills; on Maiden's Choice lane or Caton avenue north of Maiden's Choice run; on Brunswick street opposite Lehmon street and at outlet to drain-pipe laid across and under bed of Brunswick street; at northeast end of stone culvert over Baltimore street and northeast branch of Gwynn's Falls; at east end of Edmondson avenue bridge over Gwynn's Falls; at

alley south of North avenue and east of Ninth avenue; at North avenue and Peck's run; at North avenue aud Smallwood street; at Jefferson Place and Twenty-third street; at Oak and Twenty-sixth streets and on Windemere avenue.

New wooden drain-boxes were constructed at the following street intersections, viz:

Stafford street west side of Caton avenue, 30x2x1; Millington lane near Lehmon street; Frisby street between Oxford and Brady avenues, 26x2-6x1; Independence and Jefferson streets.

Wooden drain-boxes at the following places were repaired:

Oregon street east side of Caton avenue; Madison street west of Montebello avenue, at the latter place the wooden drain or box culvert was found to be in a very dilapidated condition and required to be opened up and partly renewed and strengthened with new lumber. Terra cotta pipe 18 inches in diameter was connected with it on either side to receive the drainage from the street; Brady avenue and Valley street; Merryman's avenue and Falls road; Hickory and Third avenues; Valley and Mount streets.

The stone culvert on Jackson street east of Harrison street.

Stone culvert across Gorsuch avenue east of Harrison street.

Wooden drain across Jefferson street east side of Montebello avenue

Old wooden drain-boxes were removed and replaced with stone gutters, as follows:

Across Stafford street east side of Caton avenue.

Across Druid avenue and David avenue.

Across Merryman's lane west side Charles street.

New cross-gutters paved with stone were constructed at the following places:

Brunswick street south side Frederick road.

Loudon avenue west side Millington lane.

Braddish avenue, Third and Fifth streets south side of North avenue.

Walbrook avenue west side Slingluff avenue.

Seventh street south side Walbrook avenue.

Barclay street south side Waverly avenue.

Twenty-second street intersecting Hunter alley.

track shifted from the west side of the avenue to its proper location in the bed of the avenue.

The grade of the avenue was first re-established and all necessary grading and filling done by the company. They paved between and two feet outside of outer rails of each track. The abandoned track on Elm avenue and Merryman's lane from Third avenue to Roland avenue were removed, the bed of Elm avenue shaped up, while roadway of Merryman's lane was repaved with the rubble-stone torn up in removing tracks. The Edmondson avenue, Catonsville and Ellicott City line, formerly known as the Boulevard line, and recently purchased by the Consolidated Company extends on Saratoga street from Howard to Monroe streets, on Monroe street to Franklin street, on Franklin street to the Calverton road, on Calverton road to Edmondson avenue, and on Edmondson avenue to the western city limits. It was widened from a narrow to a broad gauge, and the rubble-stone repaving from Franklin and Monroe streets to Saratoga street and Fremont avenue finished.

A double curve was constructed from Saratoga street into Howard street, southwardly, and a straight track across Howard street, connecting with the single track on Saratoga street. East from Howard street part of the asphalt block pavement on Saratoga street from Howard street to Fremont avenue is yet unpaved, by reason of the weather not permitting. A double-track line is being constructed on Schroeder street from Saratoga street to Harlem avenue, on Harlem avenue to Dolphin street, on Dolphin street to Brevard street, and on Brevard street to and connecting with the line on Biddle street, eastwardly.

This work is well advanced, and would have been nearly completed by the first of this year had the weather been more propitious.

STEAM RAILWAY TRACKS.

The Baltimore and Ohio Railroad Company changed the location of their tracks on McHenry street across Poppleton street, and constructed a couple of turnouts, with extensions, across Poppleton street into their freight yard east of Poppleton street, and between Pratt and McHenry streets.

In making these changes their tracks displaced the six-inch kerb on either side of Poppleton street, and such kerb removed was hauled to city storage lot at their expense

The sidewalks were paved with vitrified brick by the company.

A turnout was made from their tracks on Pratt street west side of Howard street, and thence a curve was laid into Howard street for a distance of about 75 feet south of Pratt street. They also shifted the location of their track at the foot of Fell street, and constructed an additional switch or turnout, with an extension, laid into their wharf.

NORTHERN CENTRAL RAILWAY COMPANY.

The only work this company did the past year was an extension of their freight track on Thames street from the east side of Fell street to about 100 feet east of Wolfe street.

All these works were done under ordinances of the Mayor and City Council, and the direction of the City Commissioner.

THE CHESAPEAKE AND POTOMAC TELEPHONE COMPANY.

This company obtained a permit on August 9, 1898, to extend their subways, and began operations a few days before the approval of the City Subway Ordinance. They commenced at Twenty-fifth and St. Paul streets and laid a line of ducts on the west side of St. Paul street to a man-hole built at the north approach to St. Paul Street bridge over Jones' Falls, and with man-holes constructed in each intersecting street. From Twenty-fifth and St. Paul streets the line extends along the south side of Twenty-fifth street to the west side of Charles street, thence northerly on the west side of Charles street to a ten-foot alley north of Twenty-fifth street. From the man-hole at the northwest side of North avenue and St Paul street, their subway extends along the north side of North avenue to Oak street, thence across to and along the south side of North avenue to the east side of Bolton street, thence southerly on the east side of Bolton street to the north side of Robert street, thence westerly on the north side of Robert street to a man-hole built on the west side of Brunt street. From this

man-hole two lateral branches are constructed, one to the base of a pole erected at the southwest corner of Robert and Brunt streets, the other to a pole in the west sidewalk about 75 feet north of Robert street. From the man-hole located at the northwest side of Robert and Bolton streets a branch subway extends on the east side of Bolton street to the south side of Laurens street, thence on the south side of Laurens street to the west side of Jenkins alley, and thence on the west side of Jenkins alley to a pole about 50 feet south of Laurens street. From the man-hole constructed at the northeast side of Robert street and Madison avenue a line of ducts is laid to a double man-hole or vault on the east side of Madison avenue, about 100 feet north of Robert street and in front of their sub-exchange, now being erected on lot east side of the avenue. From man-hole at Robert and Madison avenue their subway extends southerly on the east side of Madison avenue to the north side of McMechen street. Man-holes are built at every street intersecting Madison avenue, except at Wilson and McMechen streets.

Before their subway was completed in Madison avenue to McMechen street, Mr. Eccles, Acting Mayor at the time, directed Mr. Connett, Acting City Commissioner, to have the company suspend operations, at the same time revoking their permit, until the City Electrical Subway Commission could inquire into the law as to the company's prior right to the selection and use of the streets. The company thereupon closed up their work. Some repaving yet remains to be done.

BELAIR STORAGE LOT.

The board fence enclosing the city storage lot was put in thorough repair and a shed was built the entire width of the lot on Low street, so that all boilers, pumps, tool boxes, etc., may be placed under cover when not in use. The shed was made sixteen feet wide and at the southeast end a blacksmith shop was erected and equipped with all necessary tools. All the blacksmithing for the sub-departments was done during the past season by day's labor; all the tool boxes were also repaired. 214 cart

loads of rubble paving stone, 84 of Belgian blocks, 16 of old asphalt blocks, 167 lineal feet, 4½-inch old kerb, 66 lineal feet of flagstones and 150 lineal feet gutter stones were hauled into the yard from Mt. Royal avenue by the contractors who were repaving Mt. Royal avenue. All of this material was used on the repairs of streets.

The superintendent of the lot makes out weekly statements accounting for material received and sent out on requisitions and to what sub-department credited.

In connection with the repairs of paved streets, I would recommend that more attention be given to the placing of new regulation kerb and gutter stones in those sections of the city where the streets are now lined with what may be termed "colonial" or irregular shaped pieces of kerb, and the gutters paved with small inferior gutter stones.

I would also suggest that the kerb be not less than 22 inches in depth, axe-faced and pointed, deep enough to admit of the new regulation gutter-stones abutting close up against it.

To replace these unsightly kerb, gutter-stones and cobblestone rebuts with new kerb and gutter-stones would not only tend to beautify and widen our highways, but also improve the sanitary condition of them by having smoothly paved gutters. It would also enable property-holders to renew or construct better sidewalks, which they cannot do at present. I would further suggest that those streets having light grades be first selected for improvement. I am sure that no such condition of things exists in the streets of any other city of even one-half the population.

In regard to repairs of asphalt block paved streets, I will call your attention to the need of repairing Fulton avenue from Baltimore street to Edmondson avenue, where not guaranteed; also the west driveway of Eutaw place from Laurens street to Dolphin street, and Eutaw street from Dolphin street to Madison street wherever required, Charles street from Madison street to Chase street, and Cathedral street from Monument street to Madison street will also need repairs the coming season.

In regard to the construction of extensions and of new electric street railways I would suggest that all street railway companies

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In regard to the construction of extensions and of new electric street railways I would suggest that all street railway companies

be not only required to submit plans showing the location of their tracks in the streets, but also that a profile of the centre line of all streets in which they locate their lines, together with cross-sections at all intersecting streets, or wherever any elevation or depression may intervene, be submitted to the City Commissioner for his inspection before approval. The grades of the tracks in the streets should be established by the City Commissioner before construction is begun.

JNO. S. PATTERSON,
Assistant City Commissioner.

MISCELLANEOUS ACCOUNT.

March 18,	Hirshberg, Hollander & Co., blue print frame	$5 40
" 25,	N. M. Rittenhouse, 800 feet 15-inch terra cotta pipe	224 48
April 25,	Geo. P. Thomas, boots	1 13
" 25,	Geo. P. Thomas, boots	6 25
" 26,	W. H. Johnson, iron pins	5 00
" 26,	Geo. P. Thomas, boots	3 38
" 30,	Sanbourn Perris Manufacturing Company, 3 vol., 1, 2 and 3	180 00
May 7,	M. J. O'Neal	21 80
		$447 44
" 7,	Wages	65 78
		$513 22

Report of the Assistant City Commissioner, Sewer Department.

Baltimore, Md., December 31, 1898.

W. W. Varney, Esq., City Commissioner:

Sir: I have the honor of submitting the following report of the operations of this department for the year ending December 31, 1898.

SEWERS UNDER CONSTRUCTION JANUARY 1, 1898.

There were two sewers under course of construction at this time: Clifton avenue sewer and Lanvale, Stricker and Gilmor streets sewer.

CLIFTON AVENUE SEWER.

Ordinance No. 29, Approved June 16, 1897.

This sewer is located in the beds of Clifton avenue and Payson street entirely upon what is now private property. It begins at the intersection of Clifton avenue and Monroe street, connecting at this point with the Bruce alley sewer, and extends thence westerly in Clifton avenue with a diameter of 4 feet, a distance of 300 feet; thence continuing in Clifton avenue with a diameter of 3.5 feet to Payson street, a distance of 200 feet; thence northerly in Payson street with a diameter of 3.5 feet, a distance of 142.3 feet. The total length being 642.3 feet.

The section of this sewer is circular throughout. It is built of bricks, laid in two rings nine inches thick. The outer ring is composed of machine brick. In the inner ring vitrified bricks were used in the construction of the invert to the height of one-fourth of the diameter; the rest is composed of hard-burnt hand-made brick. In the construction of this work, where the ground was sufficiently firm, the excavation was shaped to receive the brick invert. In soft and yielding ground the brick-work was laid in a cradle of rubble masonry.

Two man-holes were constructed along the line of this sewer, and also two inlet drop wells, one at Monroe street and one at Payson street. One double gutter-plate inlet was built on the southwest corner of Payson street and Clifton avenue.

STATEMENT SHOWING COST OF WORK.

Excavation 1219 cubic yards at 55c.	$670 45
Brick-work 249.3 cubic yards at $9.26.	2,308 52
Rubble masonry 197.6 cubic yards at $4.44.	877 34
Man-hole No. 1, total cost.	77 45
Man-hole No. 2, total cost.	65 62
Drop No. 1, total cost.	252 43
Drop No. 2, total cost.	305 16
Inlet southwest corner Payson street.	184 58
15-inch terra cotta pipe at dam.	26 25
Refilling.	201 66
Wing walls	21 55
Miscellaneous items, hardware, oils, etc.	248 87
Engineer, watchman and superintendent.	1,956 16
Building centres.	58 60
Paid A. T. Ports for damage to crop.	100 00
Total cost of work.	$7,354 64

Appropriation.	$12,000 00	
Expenditure.	7,354 64	
Balance.	$4,645 36	

SEWER IN LANVALE AND STRICKER STREETS AND LATERAL SEWER IN LANVALE AND GILMOR STREETS.

Ordinance No. 164, Approved November 2, 1896.

The main sewer begins at the intersection of Lanvale and Calhoun streets, connecting at that point with the "new" Calhoun street sewer, and extends thence in Lanvale street, with a diameter of 4.75 feet, to Stricker street, a distance of 370 feet; thence in Stricker street, with a diameter of 3.75 feet, to Winchester street, a distance of 1,665 feet. Total length, 2,035 feet.

The lateral sewer begins at the intersection of Lanvale and Stricker streets, connecting with the main sewer at that point, and extends in Lanvale street, with a diameter of 3 feet, to Gilmor street, a distance of 443 feet; thence in Gilmor street, with a diameter of 2.5 feet, to Lafayette avenue, a distance of 383 feet. Total length of lateral sewer, 826 feet.

These sewers are circular in section throughout. The main sewer is built of brick, two rings thick. In the inner ring hand-

made bricks were used in a portion of the invert and in the arch; the rest of the invert is composed of vitrified bricks. In the outer ring machine-made bricks were used. The construction of that part of the lateral sewer in Lanvale street is similar in every respect to the construction of the main sewer. In soft and yielding ground rubble stone cradle was laid to receive the invert, while in good, hard ground the excavation was shaped to receive the brick-work. That portion of the lateral sewer in Gilmor street consists of cast-iron pipe, each joint securely caulked with Portland cement, and laid on a bed of concrete to prevent settlement.

STATEMENT SHOWING COST OF THE WORK SINCE JANUARY 1, 1898.

Excavation, 3,690 cubic yards at 71c	$2,619 90	
Brick-work, 657 cubic yards at $8.65	5,683 05	
Refilling	1,013 76	
Moving machinery	31 08	
Repaving 17,860 square feet at 22c	392 92	
Miscellaneous items	732 64	
		$10,473 35

Thirty-inch Cast-iron Pipe in Gilmor Street.

Excavation, 387 cubic yards at $1.43	$553 41	
Refilling	132 50	
30-inch C. I. pipe, in place, 387 linear feet at $2.75.	1,064 25	
Repaving, 5,478 square feet at 3c	164 34	
Miscellaneous items	794 36	
		2,708 86
Inlet N. E. cor. Gilmor and Lanvale streets		141 86
" N. W. cor. Stricker and Mosher streets		120 79
" S. W. cor. Gilmor street and Lafayette avenue		102 81
" S. E. cor. Gilmor and Lanvale streets		193 36
" N. W. cor. Stricker and Winchester streets		159 41
" N. E. cor. Stricker and Winchester streets.		205 67
" N. W. cor. Gilmor street and Lafayette avenue		130 56
Repaving at inlet N. W. cor. Gilmor and Lanvale streets		41 31
Paving by Maryland Pavement Co. at Lafayette avenue and Stricker street		180 95
Regular force, superintendent, watchman and inspector, engineering, etc		3,247 76
Total		$17,706 69

Appropriation		$40,000 00
Expended since January 1	$17,706 69	
Expended previous to January 1.	15,555 14	
		33,261 83
Balance		$6,738 17

SEWERS COMMENCED SINCE JANUARY 1, 1898.

Since January 1 construction of the following sewers was commenced: Vine street sewer, Broadway extension sewer, Brice alley sewer, Harris Creek sewer and Barclay street sewer, two inlets on the Alluvion street sewer and one inlet on the Mosher street sewer.

VINE STREET SEWER.

Ordinance No. 19, Approved March 18, 1898.

This is a short section of sewer constructed at the intersection of Vine and Pine streets and connecting with the old Chatsworth Run sewer in Vine street. It is circular in section, having a diameter of 4 feet, and is built of brick two rings thick. The invert to the usual height is composed of vitrified bricks. As the soil was soft and yielding, rubble stone cradle was used throughout. Total length of sewer, 51½ feet.

In addition to the above two large side inlets were constructed, one on the east and one on the west side of Pine street, to provide for the heavy flow of water at this intersection. An overflow was also constructed from the old sewer in Pine street to the new section of sewer to relieve the former, which is overtaxed in a heavy rain.

STATEMENT SHOWING COST OF THE WORK.

Excavation, 129 cubic yards, at $1.10		$141 90
Rubble masonry, 30 cubic yards, at $8.20		246 00
Brick-work, 22 cubic yards, at $12.00		264 00
Inlet on west side Pine street		199 91
Inlet on west side Pine street		255 38
Miscellaneous items		126 83
Salary of superintendent and watchman		396 97
Engineering		165 35
Total cost of the work		$1,796 34
Appropriation	$1,800 00	
Amount expended	1,796 34	
Balance	$3 66	

BROADWAY SEWER EXTENSION.

Ordinance No. 24, Approved April 4, 1898.

This sewer is an extension, 30 feet in length, of the old sewer at the foot of Broadway. It is rectangular in section, 7 feet wide and 4 feet high, with side walls 3 feet thick, composed of broken range masonry, and rests on a pile and timber foundation. Fifteen pine piles, 12 inches in diameter at the large end, were driven to an average depth of 29 feet. The deck or timber foundation consists of 12x12-inch Georgia pine stringers and caps, securely spiked to the piles, on top of which the 6x12-inch Georgia pine flooring was laid to receive the stone side walls; this section is covered with heavy iron plates 1¼ inches thick.

In connection with the above a bulkhead composed of broken-range masonry, 3.5 feet thick, was constructed on the east side at right angles to the line of the sewer for a distance of 37 feet, joining the property of R. M. Spedden & Co. This bulkhead was constructed on a pile and timber foundation similar to the foundation for the sewer. The filling behind the wall is composed of gravel, and is held in place by means of sheath-piling. The wall is covered with stone coping 6 inches thick and 4 feet wide.

Appropriation	$2,500 00
Amount expended	2,191 94
Balance	$308 06

BRICE ALLEY SEWER.

Ordinance No. 20, Approved March 25, 1898.

This sewer is a continuation of a sewer that was built in the beds of Smallwood, Franklin, Pulaski and Lanvale streets, and Brice alley to the north building line of Lafayette avenue. From this point, where the old and new portion have a circular section of 10.5 feet in diameter, it extends with the same size northerly in Brice alley to Mosher; thence easterly in Mosher street to Payson street; thence northerly in Payson street to Riggs avenue, where the section changes from 10.5-foot circle to a 9.5-foot circle and continues in Payson street to the tracks of the Baltimore and Potomac Railroad Company.

After considerable delay on account of bids for material and awarding the contracts for the same, the work on this sewer was finally commenced about the first of August of the present year. A departure was made from the method of sewer construction previously in vogue in Baltimore. Heretofore it has been customary to start the sewer at the lower end, advancing it in a continuous section to completion. The force that was usually required by this method was comparatively small, and was under the direction of a Superintendent, who was also practically the foreman of the several gangs. Under this arrangement it was impossible for him to give the necessary attention to all parts of his work. The organization on Brice alley sewer included a superintendent and four foremen, who were in charge of the following gangs: Excavating gangs, stonemasons, brickmasons and material gang. After the arch of a sewer is turned it requires several hours for the cement to set before the centres can be drawn. To avoid the loss of time this would occasion, the work was divided into several sections, allowing the well-organized gangs to be transferred from one section to another. The economy of this method over the old one will be seen from the following: The portion of this sewer south of Lafayette avenue, which is of the same diameter, and which was constructed in 1896, cost $47 per linear foot, while the new portion cost $38 per linear foot. The accompanying photograph shows the work in progress

From a sanitary point of view the new portion of this sewer is in a better condition than most sewers in the city. Formerly the surplus mortar in the inside of the arch was not removed, leaving that part of the sewer very rough. In this case the arch was thoroughly scraped and the joints struck, making a smooth surface, thereby reducing to a minimum the danger of the sewer fouling on account of decaying organic matter, which otherwise would lodge on a rough surface.

This sewer is built of brick, two rings thick in the invert and three rings in the arch. The inner ring is composed of vitrified brick in the invert to the height of one-fourth the diamater, the rest is of hard-burnt, hand-made brick. The outer rings consists of machine-made brick. For its entire length the sewer is laid in

a foundation of rubble masonry, varying in depth with the character of the ground. There has been built up to the present date 940.6 feet of the 10.5-foot section, a 10-foot reducing section, and 134.4 feet of 9.5 section, making a total of 1,085 feet of completed work. There remains 50 feet of the 9.5-foot section to be built to complete the sewer to the Baltimore and Potomac Railroad tracks. This will be finished about February 1, 1899. There has been expended to December 31, 1898, $41,203.53.

STATEMENT SHOWING COST OF WORK.

Excavation, 8779.0 cubic yards, at $0.5961 per cubic yards.		$5,233 17
Rubble masonry, 3999.88 cubic yards, at $4.52 per cu. yds.		18,079 45
Brick-work, 1077.7 cubic yards, at $11.42 per cubic yards..		12,307 33
Filling, 1815.38 cubic yards, at 26c. per cubic yards.....		472 00
Extra hauling.....		62 00
Hardware		379 96
Cast-iron pipe for inlets.....		230 85
Lumber.....		534 43
Advertising.....		69 86
Transportation.....		34 35
Miscellaneous, items.		509 13
Engineering, surveys and construction.....		1,471 00
Superintendent		740 00
Watchmen.....		1,080 00
Total.....		$41,203 53
Appropriation.....	$48,000 00	
Expenditure.....	41,203 53	
Balance.....	$6,796 47	

Ordinance No. 123, Approved November 26, 1898.

When the Patterson Park sewer was built in 1889 a lateral which is still in first class condition was constructed in the bed of Harris Creek from Ogiers Run to Baltimore street. An ordinance was approved May 28, 1898, authorizing the reconstruction of this lateral, which is 4 feet in diameter, so as to make it have an area equal to a 6-foot circular sewer, and also providing for its extension in the bed of Grove alley from Baltimore street to Fairmount avenue. If the plans as originally adopted were carried out, this sewer would have been unnecessarily large. On August 13, 1898, I made a special report in this connection, and I again submit a copy of the same as follows:

BALTIMORE, August 13, 1898.

Mr. L. F. Lewis, City Commissioner:

DEAR SIR: As directed by you, I have investigated the plans of the Harris Creek sewer, and submit the following report:

In the first place the grade of the new section of the sewer, which is the part to be built in Grove alley between Baltimore street and Fairmount avenue, was unnecessarily flat. By making a slight change in the street grades, where the property is entirely unimproved, the grade of this section can be increased from one-tenth of one per cent. to five-tenths of one per cent., or from 1¼ inches per one hundred feet to 6 inches per one hundred feet. This change of street grades consists in raising the intersection of Chesapeake and Fayette streets about 3½ feet and lowering the intersection of Chesapeake street and Fairmount avenue about 3 feet, which requires practically the same amount of earth work as the former grade. The plans of this sewer, as originally adopted by the previous administration, called for a sectional area equal to a 6-foot circle. They also necessitate tearing out and remodelling the old section in Patterson Park, which is 418 feet long, besides an excavation of about 2,900 cubic yards of earth.

This sewer, I am informed, was calculated upon a basis of a 3-inch rainfall per hour, 100 per cent. reaching the sewer. This, in my opinion, is excessive for sewers which drain comparatively large areas. In recent good practice a 2-inch rainfall is used, 100 per cent. reaching the sewer. While this rainfall is not quite as much as that recommended by the Sewerage Commission for general use (which is 3½ inches per hour, 80 per cent. reaching the sewer, equalling $2\frac{8}{10}$ inches per hour, 100 per cent. reaching the sewer), it is, in consideration of the comparatively light street grades, ample for the present case. No exact rule or factor can be given which will apply to all conditions. The amount of the water reaching the sewer in the given time will be more or less, according to the grades of the streets, the character of the paving, soil, etc., and this must be determined according to these conditions and by experience.

By assuming a 2-inch rainfall and considering the increased grade, I find that a circular section four feet in diameter is sufficient to carry off the water from the territory to be drained by the Harris Creek sewer.

Adopting this section it will not be necessary to disturb the old portion of the sewer in Patterson Park, which is four feet in diameter and has a grade of six-tenths of one per cent.

There will, therefore, be a clear saving of about $16,000, which will be made up of the following items:

Cost of excavation on old section	$3,000 00
" " remodeling " "	9,000 00
Difference between the cost of the four-foot sewer and the six-foot sewer	4,000 00
Total	$16,000 00

Yours truly,

A. M. BROSIUS,
Assistant City Commissioner.

November 26, 1898, Ordinance No. 123, was approved authorizing the changes recommended in the above report and extending the sewer in Fairmount avenue from Grove alley to Chesapeake street, thence in Chesapeake street to Fayette street.

The piling and timbering for this work is completed in Grove alley from Baltimore street to Fairmount avenue. The construction of the sewer proper has just been commenced.

BARCLAY STREET SEWER.

This is a 30-inch sewer, designed to meet immediate requirements only. It commences at a point 113.5 feet west of the west kerb of Barclay street and 114.2 feet north of the north kerb of Thirty-first street (Waverly street), and extends easterly in the bed of an alley between Thirty-first and Thirty-second streets to the east side of Barclay street 151.5 feet; thence northerly in the bed of Barclay street 148 feet, making a total length of 299.5 feet. The pipe is laid in a cradle of concrete. In the east and west side-

walks of Barclay street at said alley two inlets are to be constructed. About 231 feet north of the north kerb of Thirty-first street the 30-inch pipe receives a 20-inch drain, which is located in private property east of Barclay street.

This sewer in the future can be incorporated in a general drainage system for this locality.

The cost of this work is $2,202.35, which was charged to Annex fund. Ordinance No. 34, Approved May 11, 1898.

INLETS, SCOTT AND OSTEND STREETS.

Two inlets were constructed, one on the southeast corner and one on the southwest corner of Scott and Ostend streets, connecting with the Alluvion street sewer. The cost of the first was $54.80, and the cost of the second was $82 67, making a total of $137.47, which was charged to the account of paving cross streets. Ordinance No. 34, approved May 11, 1898.

MOSHER STREET INLET.

Ordinance No. 132, Approved December 8, 1898.

Work under this ordinance was commenced December 12, 1898, and will be finished in the month of January, 1899.

SCHOOL-HOUSE DRAINS.

At the instance of the Inspector of Buildings this department since the 10th of August has constructed drains for the following school-houses, the cost of which was charged to the Building Inspector's Department:

No. 2 Grammar School.
" 5 " "
" 5 Primary "
" 11 " "
" 14 " "
" 15 Grammar "
" 16 " "
" 23 Primary "
Eastern Female High School.
City College (temporary).

SEWER AND INLET REPAIRS CHARGED TO ORDINANCE No. 34, APPROVED MAY 11, 1898.

	Dr.	Cr.
Amount appropriated		$6,000 00
Arch and Josephine streets	$13 34	
Bloom and Etting streets	23 36	
Brice alley and Baker street	218 59	
Barre street and Spring alley	68 76	
Baltimore street and Central avenue	7 41	
Baltimore and Schroeder streets	3 46	
Bloom and Division streets	42 50	
Broadway drain	38 25	
Burgundy and Ridgely streets	9 79	
Boston and Windsor streets	5 78	
Bond and Lanvale streets	28 36	
Beason street, below Hull	6 92	
Commerce street, foot of	8 58	
Central avenue and Orleans street	9 22	
Cross street, near Covington	15 61	
Central avenue and Pratt street	28 68	
Calhoun and Mosher streets	11 20	
Central avenue and Mullikin street	68 76	
Central avenue and Lexington street	8 82	
Central avenue and Bank street	3 78	
Central avenue and Baltimore street	7 13	
Central and Fairmount avenues	10 35	
Central avenue and Lombard street	6 25	
Central avenue and Pratt street	21 40	
Camden and Howard streets	5 10	
Charles street and Uhler alley	61 16	
Cross and Race streets	17 23	
Chase and Ensor and Chase and Valley streets	31 86	
Cross and Light streets	3 41	
Camden and Light streets	43 01	
Cross and Charles streets	3 41	
Central avenue and Lexington street	16 10	
Carey and Ramsay streets	7 92	
Carey and McHenry streets	37 07	
Carey street, opposite Ramsay	4 39	
Carey street, opposite McHenry	2 89	
Charles and Baltimore streets	56	
Exeter and Low streets	3 35	
Eutaw and Ostend streets	69 49	
Foster and Luzerne streets	41 18	
Federal and Wolfe streets	3 27	
Falls road and North avenue	3 17	
Fulton avenue and Mary street	4 34	
Fayette street and Central avenue	2 75	
Fayette and Luzerne streets	25 32	
German and Grant streets	17 82	
Gay street and Rogers avenue	55 24	
Goodman alley and Cross street	3 42	
Gilmor street and Harlem avenue	6 78	

Granby and High streets	$ 3 83
Girard avenue and Sherman Place	14 70
Gay and Preston streets	1 50
German and Penn streets	11 58
Hoffman street and Milton Place	3 50
Holliday and Saratoga streets	6 75
Hanover and Fayette streets	3 89
Howard and Cross streets	20 49
Hanover and Cross streets	55 08
Hanover and Cross streets, N. W. cor	32 28
Howard and Centre streets	8 58
Howard and Ostend streets	39 24
Howard and Lexington streets	5 50
Howard and Henrietta streets	164 07
Howard and Lexington streets, N. W. cor	11 33
Light and Lee streets	74 34
Light and Balderson streets	33 40
Light and Barre streets	75 24
Lombard and Hanover streets	3 14
Lombard and Howard streets	2 42
Liberty street	6 50
Lafayette avenue and Calhoun street	18 94
Lombard street and Central avenue	15 77
Light and Baltimore streets	8 42
Mosher street sewer	2,796 61
*Miscellaneous account	513 22
Marsh Market Space	10 24
Mount and Pressbury streets	3 33
Myrtle avenue and Saratoga street	7 48
Myrtle avenue and Mulberry street	1 50
Monument street, 1414 and 1415 east	7 55
Monument street and Montford avenue	18 29
North and Druid Hill avenues	80
North avenue and Oak street	2 63
North and Greenmount avenues	11 00
Pratt and Hanover streets	86 54
Pratt and Oregon streets	8 58
Park avenue and Division street	48 08
Pratt street and Spears' Wharf	59 45
Pratt and Howard streets	2 56
Park avenue and Lexington street	3 74
Paca and Barre streets	2 75
Pine and Saratoga streets	54 89
Pratt street and Marsh Market Space	10 67
Pratt and Carey streets	38 14
Pine street and Spring alley	1 95
Pratt and McElderry streets	2 38
Pulaski street and Edmondson avenue	3 45
Pierce street and Myrtle avenue	2 30
Pennsylvania avenue and Mary street	13 06
Regester and Gough streets	8 13
South and Cable streets	25 29
Stockholm and Leadenhall streets	4 39

Saratoga and Greene streets	$18 00	
Saratoga and Holliday streets	21 05	
Twenty-first street and Lovegrove alley	11 37	
Truck House No. 4	6 59	
Tessier and Biddle streets	69 69	
Wilson street and Morris alley	324 62	
Watson street and Central avenue	7 39	
Warner and Ostend streets	3 14	
Warner and Cross streets	3 14	
Washington and Lanvale streets	7 75	
Wolfe and Fayette streets	15 73	
	$5,994 50	$6,000 00

Appropriation	$6,000 00
Expenditure	5,994 50
Balance	$5 50

SEWER AND INLET REPAIRS CHARGED TO REPAIRS OF PAVED STREETS.

Ordinance No. 34, *Approved May* 11, 1898.

Cider alley	$22 05
Central avenue and Bank street	3 40
Calhoun alley	4 46
Carters alley	18 05
Central avenue and Gough street	11 92
Federal and Wolfe streets	69 12
Fremont and McHenry streets	7 79
Hammond and Albemarle streets	13 59
Holliday street	77 08
Lexington and Eutaw streets	6 79
Leakan and Boston streets	6 79
Lee and Light streets	79 18
Mill and Chestnut streets	8 01
Mill and Pratt streets, S. W. cor	31 59
Mill and Pratt streets, S. E. cor	18 33
McKim and Madison streets	6 79
Orleans and Patapsco streets	137 64
Pennsylvania avenue and Lanvale street	37 89
Read and St. Paul streets	42 57
Wilkens' avenue bridge inlet	18 97
Total	$622 01

From the above statement it will be seen that the appropriation for repairs of sewers is not sufficient to meet the requirements. Most of the work has been done as cheaply as possible, in many cases the repairs being only temporary, as the amount of money

to defray the cost was very limited. If a more liberal appropriation is allowed all repairs could be of a permanent character. I would, therefore, urge that an appropriation of at least $15,000 be made. This would include the amount necessary to carry on the work of renewing the invert of the Mosher street sewer. This invert is in a very dangerous condition, being entirely washed out in some places, and it is probable that during a heavy storm part of the sewer itself would be destroyed. This work has been in progress for the past two years as far as the appropriations would allow.

RECOMMENDATIONS AND SUGGESTIONS.

CENTRAL AVENUE AND SCHROEDER'S RUN SEWERS.

There are two old stone sewers—one in Central avenue from the dock to Orleans street, and one in the original bed of Schroeder's run from Pratt street to Saratoga street—the condition of which are a menace to health, as well as dangerous to both traffic and the adjacent property. As these are the only sewers in this condition I would recommend the construction of new sewers to replace the old ones as soon as possible. The necessity of this is apparent from the following facts:

Central avenue sewer, which is in the more serious condition, has a very flat arch built of rough stone, laid in mortar of an inferior quality, apparently nothing more than ordinary lime mortar. In a great many places the mortar has entirely disappeared, causing the keystone to fall out, leaving the arch in such shape that it is hard to understand how it can sustain even its own weight. At Gough and Pratt streets it is especially dangerous, the crown of the arch having sagged as much as six and eight inches from a true curve. The bottom, which is of stone construction similar to a cobble-stone pavement, is also in a bad condition. For almost the entire length of the sewer it has been washed out in the middle from one foot to two feet deep. This, in the near future, will result in the entire destruction of the bottom, and then the side wall will be undermined, and the collapse of the entire structure will follow.

The inlets along the line, as well as their connections with the sewer, are also dangerous and require constant attention.

This sewer, besides being unsafe to traffic and costly to keep in repair, is in a very serious condition otherwise. The bottom, owing to its rough character, catches and retains all kind of debris and organic matter which putrify and send up poisonous gases through the street inlets and the house connections where the plumbing is defective.

While Schroeder's run sewer is not in quite as dangerous a condition in reference to traffic as Central avenue sewer, it is very objectionable from a sanitary standpoint, owing to the fact that most of it is under private property. It is also liable to cause serious damage to the buildings in the vicinity; in fact, in some instances during hard rains the water has overflowed at places where the sewer is uncovered and washed through the first floor of some of these buildings. On account of defects in the structure of this sewer at several points there is a possibility of its caving in, endangering both life and property.

The approximate cost of the reconstruction of the Central avenue sewer from the dock to Orleans street including the necessary inlets and man-holes, would be $182,000.

In the reconstruction of the Schroeder's run sewer it would be necessary to locate the new sewer as follows: Connecting with the old sewer at Pratt Street; thence in Pratt street to Schoreder street; thence in Schroeder street to Lexington street; thence in Lexington street to Arlington avenue; thence in Arlington avenue to Saratoga Street; thence in Saratoga street to Carrollton avenue, connecting with the old sewer at that point. The approximate cost of this sewer, with manholes and inlets would be $100,000.

LIGHT STREET SEWER.

In the vicinity of Light and Jephson streets there are several ponds, the condition of which have been condemned by the Health Department. In order to put this locality in a sanitary condition it will be necessary to construct a sewer in Moale street from the

water front westerly to Light street; thence in Light street northerly to Jephson, with a lateral westerly in Jephson street, from Light street to Charles street. The part in Moale and Light street would be constructed of brick and would be the lower portion of a main sewer, which will be eventually extended northerly in Light street from Jephson street to Winder street; thence easterly in Winder street to Byrd street; thence northerly in Byrd street to Wells street. For immediate requirements, however, it would be necessary to build this sewer to Light street and Jephson street only, with a lateral construction of pipe in Jephson street to Charles street. The approximate cost of this work would be $18,000.

EXTENSION OF BRICE ALLEY SEWER.

The present work on the Brice alley sewer will extend to Payson street and the south side of the tracks of the Baltimore and Potomac Railroad Company. At Presstman and Monroe streets is the southern end of a sewer known as the "Presstman street sewer." These two sewers are sections of a main sewer designed to provide for the drainage of the territory tributatary to the stream known as Silver run. Between the points above mentioned the stream is still open. A section of sewer, which will complete this general system, will be 1,754 feet long, and this section finished, the entire property adjacent will be available for development. Aside from this fact, the open stream is in a very unsanitary condition on account of the amount of slaughter-house and other sewage being emptied into it. The approximate estimate for this work is $116,000.

CENTRE STREET SEWER.

Owing to the steep grades of adjacent streets the portion of Centre street between St Paul street and Park avenue is flooded, even in moderate rains. There is now a sewer in Centre street as far as St. Paul street. This sewer should be extended to Howard street. The approximate cost of this extension, with necessary inlets and manholes is $30,000.

CANTON AVENUE SEWER.

On Canton avenue between Boston and Elliott streets, the storm water, owing to the two descending grades which meet in the middle of the block, is thrown into open ground on the east side of Canton avenue, forming a pond which has become a serious nuisance. To remedy this effectually, it would be neccessary to construct a sewer in Canton avenue from the water front to Elliott street. The approximate cost with inlets and manholes would be $15,000.

PINE STREET RELIEF SEWER.

Owing to the inadequacy of the existing sewer and inlets at Pine and Lexington streets, it is advisable to extend the relief sewer, recently constructed at Vine and Pine streets, in Pine and Lexington streets and enlarge the inlets at Lexington street and connect the same with said sewer. The approximate cost of this work would be $2,500.

CHARLES STREET PIPE LINE.

At Charles and Preston there are two cross gutters, covered with planks, which mar the appearance of the intersection. This character of covering, besides requiring constant repairs, is difficult to keep in good sanitary condition. By constructing a pipe sewer in Charles street from the end of the present sewer at Mt. Royal avenue to Preston street with inlets on the south side of Preston street, these cross gutters could be abandoned. The approximate cost of this would be $4,000.

INLETS BUSH STREET SEWER.

As there is an ordinance pending authorizing the paving of Bush street from the dock to James street it would be advisable to construct twenty inlets along the line of Bush Street sewer. It would be more economical to do this work before the street is paved. The approximate cost would be $6,000.

INLETS LOVEGROVE ALLEY SEWER.

The Lovegrove alley sewer from North avenue, is not provided with the necessary inlets and manholes. To make it efficient it will require the construction of six inlets and five manholes. The approximate cost would be $3,000.

INLETS BOSTON AND PATUXENT STREETS.

At Boston and Patuxent streets there are two inlets, one on the northeast corner, and one on the south side of Boston street on line with the east kerb of Patuxent street, which are too small to take the storm water collecting at this point. This has occasioned considerable inconvenience by the water flowing through private property to the harbor. These inlets should be enlarged and the wooden flume which carries the water from them repaired. Any work of a permanent character would be unadvisable as in the near future it would be removed by a large trunk sewer. The approximate cost of this work would be $500.

HILLEN ROAD CULVERT.

On Hillen road at Lake Montebello there is an old bridge the abutments of which are in a bad condition. They are built of rubble masonry, laid apparently almost dry. It is advisable to replace this bridge with a culvert or a section of sewer. The former would cost about $500, and the latter about $1,000. For present requirements the culvert, in my opinion, would be sufficient.

RAINFALL.

There is a wide difference of opinion among authorities regarding the amount of rainfall that it is advisable to assume in calculating the size of storm water sewers. Some claim that an allowance of one-half inch per hour reaching the sewer is sufficient, while others consider it necessary to provide for as much as four inches per hour. This variation is due chiefly to the fact that the several authorities have arrived at their conclusions from experience and observations based upon local conditions. The value of this factor in the formula for determining the amount of water that a sewer will be required to carry off, is apparent from the following: Assuming a territory of one hundred acres and the grade of a proposed sewer as one foot in one hundred feet, with one inch rainfall reaching the sewer per hour, the size of the sewer will be three feet nine inches in diameter, which will cost approximately $13.00

per linear foot. With a three inch rainfall per hour, the diameter will be five feet six inches, costing approximately $21.00 per linear foot. In each of the above cases it is supposed, for the sake of comparison, that the excavation is 10 feet deep.

Realizing the importance of determining the amount of rainfall to be assumed for the City of Baltimore, I would recommend that a series of observations be made during the summer months to ascertain the efficiency of the existing sewers. From the result of these observations an exact basis can be established for future use. The cost of carrying on this work would be approximately $2,500.00.

Very respectfully,

A. M. BROSIUS,

Assistant City Commissioner.

SEVENTIETH ANNUAL REPORT

—— OF THE ——

BOARD OF COMMISSIONERS OF PUBLIC SCHOOLS

—— TO THE ——

Mayor and City Council of Baltimore,

—— FOR THE ——

FISCAL YEAR ENDING DECEMBER 31st, 1898.

BOARD OF COMMISSIONERS OF PUBLIC SCHOOLS

FOR 1898.

OFFICERS:

PRESIDENT.....HENRY F. NEW.
SECRETARY.....CHAS. F. BENDER.
SUPERINTENDENT.....HENRY A. WISE.
ASSISTANT SUPERINTENDENT.....JOHN E. McCAHAN.
ASSISTANT SECRETARY.....CHAS. H. BOND.
SUPERINTENDENT OF SUPPLIES.....JAS. F. MORGAN.
LIBRARIAN.....GEO. W. McGILL.
CLERK TO SECRETARY.....SOLOMON L. AUERBACH.
CLERK TO SUP'T AND SEC'Y.....ELLWOOD A. GREEN.

MEMBERS OF THE BOARD:

HON. WM. T. MALSTER, MAYOR.

Ward.	*Name.*	*Address.*	*Term Expires.*
1.	EDWIN J. GRIFFIN	2212 E. Pratt St	1901
2.	JOHN H. HORST	1815 Eastern Ave	1899
3.	EDWARD ESSLINGER	1514 E. Baltimore St	1900
4.	J. J. VALENTINI, M.D.	1002 E. Pratt St	1902
5.	HENRY J. BENTZEL	710 Aisquith St	1901
6.	ADOLPH P. SCHUCH	1939 Orleans St	1900
7.	EDWARD BRADY	1839 N. Caroline St	1902
8.	JOHN T. FOLEY	4 Light St	1899
9.	MICHAEL SHEEHAN	8 Light St	1899
10.	JOHN J. FAUPEL	231 N. Howard St	1902
11.	WM. W. DIX	836 N. Eutaw St	1900
12.	G. LANE TANEYHILL, M.D.	1103 Madison Ave	1901
13.	HARRY K. MULLER	202 W. Lexington St	1899
14.	CHAS. H. GATCH	507 N. Arlington Ave	1900
15.	CHAS. H. HEINTZEMAN	922 S. Charles St	1901
16.	JOHN A. JONES	526 W. Barre St	1902
17.	BENJAMIN F. HISS	11 E. Randall St	1900
18.	IRWIN H. ELDERDICE, M.D.	721 Columbia Ave	1902
19.	M. H. CARTER, M.D.	1800 W. Baltimore St	1899
20.	COLUMBUS C. ISAACS	702 N. Carrollton Ave	1901
21.	HENRY F. NEW	West Arlington	1901
22.	W. EDWIN PEREGOY	26 W. Twenty-fifth St	1901

LOCAL COMMITTEES.

GRAMMAR SCHOOLS.

No.	*Location.*	*Committees.*
1.	Male—N. E. Cor. Fayette and Greene Streets	Messrs. Faupel and Muller.
	Female—S. W. Cor. Fayette and Greene Streets	" Muller and Faupel.
2.	Broadway and Bank St	" Horst and Esslinger.
3.	High St., near Fayette	" Esslinger and Valentini.
4.	Sharp St., near Montgomery	" Heintzeman and Hiss.
5.	Greenmount Ave. and Eager St.	" Foley and Brady.
6.	Division St., near Lanvale	" Taneyhill and Isaacs.
7.	Eastern Ave. and Patuxent St.	" Griffin and Horst.
8.	Hollins and Monroe Sts	" Carter and Wacker.
9.*	Male—808 N. Calvert St. / Female—411 Courtland St.	" Sheehan and Dix.
10.	William St. and Warren Ave.	" Hiss and Heintzeman.
11.	Bond and Jefferson Sts	" Schuch and Bentzel.
12.	Ridgely St., near Fremont	" Heintzeman and Wacker.
13.	Aisquith St., near Lexington	" Esslinger and Bentzel.
14.	No school	
15.	Carrollton Ave. and Lexington St.	" Gatch and Carter.
16.	Hull and Clement Sts	" Hiss and Horst.
17	Washington St., near Fayette	" Schuch and Esslinger.
18.	Harlem Ave. and Monroe St.	" Carter and Isaacs.
19.	Park Ave. and Hoffman St	" Taneyhill and Sheehan.
20.	Eden and Federal Sts	" Brady and Foley.
21.	Gilmor and Presstman Sts	" Isaacs and Gatch.
22.	Mulberry St., near Fremont	" Muller and Faupel.

*Grammar and Primary.

PRIMARY SCHOOLS.

1.	Male—N. E. Cor. Fayette and Greene Streets	Messrs. Faupel and Muller.
	Female—S. W. Cor. Fayette and Greene Streets	" Muller and Faupel.
2.	Gough and Stiles Sts	" Valentini and Esslinger.
3.	High St., near Fayette	" Valentini and Bentzel.
4.	Hanover and Lee Sts	" Heintzeman and Hiss.
5.	Broadway and Ashland Ave	" Brady and Foley.
6.	Ann St., near Canton Ave	" Horst and Esslinger.
7.	Mullikin St., near Aisquith	" Schuch and Valentini.
8.	Caroline St., near Lombard	" Esslinger and Schuch.
*9.	See above	" Dix and Sheehan.
10.	Hollins St., near Schroeder	" Muller and Gatch.
11.	Gilmor and Mosher Sts	" Carter and Isaacs.
12.	Barre and Warner Sts	" Jones and Wacker.
13.	Patterson Park Ave. and McElderry St	" Schuch and Griffin.
14.	Linden Ave. and Wilson St.	" Taneyhill and Dix.
15.	Carrollton Ave. and Saratoga St.	" Gatch and Carter.
16.	Harford and Ashland Aves	" Foley and Bentzel.
17.	Light and Poultney Sts	" Hiss and Heintzeman.
18.	Argyle Ave., near Lanvale St.	" Isaacs and Taneyhill.

19.	Park Ave. and Hoffman St.	"	Sheehan and Taneyhill.
20.	Preston and Eden Sts	"	Brady and Foley.
21.	Pennsylvania Ave. and Robert St.	"	Isaacs and Taneyhill.
22.	Ramsay St., near Scott	"	Wacker and Jones.
23.	Gough and Wolfe Sts.	"	Griffin and Horst.
24.	Fait Ave. and Patuxent St.	"	Griffin and Horst.
25.	Bond St., near Canton Ave.	"	Horst and Esslinger.
26.	Orleans St., near Bond	"	Schuch and Valentini.
27.	Fayette and Chester Sts.	"	Griffin and Schuch.
28.	Battery Ave. and Clement St.	"	Hiss and Heintzeman.
29.	Sharp St., near West	"	Heintzeman and Jones.
30.	Hollins St., near Monroe	"	Carter and Wacker.
31.	Schroeder and Pierce Sts.	"	Gatch and Faupel.
32.	Guilford Ave. and Lanvale St.	"	Foley and Dix.
33.	Light and Clement Sts.	"	Hiss and Heintzeman.
34.	James St., near Carey	"	Jones and Wacker.
35.	Hanover St., near Winder	"	Hiss and Heintzeman.
36.	2223 E. Baltimore St.	"	Griffin and Schuch.
37.	Patterson Park Av. and Biddle St	"	Schuch and Bentzel.
38.	Male—Chesapeake and O'Donnell Sts. Female—Chesapeake and Hudson Sts.	"	Griffin and Horst.
39.	Riggs and Carrollton Aves.	"	Isaacs and Gatch.
40.	Male and Female—Eastern and Montford Aves.	"	Griffin and Horst.

ENGLILH-GERMAN SCHOOLS

1.	Druid Hill Ave., near Biddle St.	Messrs.	Dix and Faupel.
2.	Charles and Ostend Sts.	"	Hiss and Heintzeman.
3.	Baltimore St., near Aisquith.	"	Esslinger and Valentini.
4.	Chase and McDonogh Sts.	"	Bentzel and Schuch.
5.	Lexington St., near Fremont.	"	Muller and Faupel.
6	Ramsay and Smallwood Sts.	"	Carter and Wacker.
7.	117 Jackson Place	"	Esslinger and Horst.

COLORED SCHOOLS.

High—	Saratoga St., near Charles	Messrs.	Sheehan and Dix
1.	Grammar—13 E. Saratoga St.	"	Sheehan and Dix.
2.	Grammar—Jefferson nr. Caroline.	"	Schuch and Valentini.
3.	Grammar—Howard and Montgomery Sts.	"	Heintzeman and Jones.
4	Grammar—Stricker and Mulberry	"	Gatch and Isaacs.
1.	Male—413 Courtland Sts Female—Saratoga near Charles	"	Dix and Sheehan.
2.	Rogers Ave., near Lexington St.	"	Bentzel and Valentini.
3.	Hill St., near Sharp	"	Heintzeman and Hiss.
4.	Biddle St. near Pennsylvania Av.	"	Dix and Taneyhill.
5.	Caroline St., near Bank	"	Horst and Griffin.
6.	Barre St., near Eutaw	"	Jones and Wacker.
7.	Waesche St., near Fremont Ave.	"	Muller and Faupel.
8.	Bond St. and Ashland Ave.	"	Bentzel and Esslinger.
9.	Carey and Chappell Sts.	"	Isaacs and Gatch.
10.	*Girard Ave. and Sherman Place.	"	Bond and Bentzel.

*Grammar and Primary.

ANNEX SCHOOLS.

1.	Gorsuch Ave. and Tyler St.	Messrs.	Bond and Foley.
2.	York road, near Merryman's lane	"	Bond and New.
3.	Male—Oak and 24th Sts. / Female—26th and St. Paul Sts	"	Bond and Taneyhill.
4.	Chestnut and 37th Sts	"	Bond and New.
5.	Hickory Ave., near 37th St.	"	Bond and New.
6.	Chestnut Ave. and 37th St.	"	Bond and New.
7.	Woodberry Ave., near Hooper Ave	"	New and Bond.
8.	Francis and Clifton Sts.	"	New and Isaacs.
9.	Lafayette Ave., extended	"	New and Carter.
10.	Old Frederick road, near 13th St.	"	New and Carter.
11.	Millington Ave. and Lehman St.	"	Gatch and New.
12.	No school		
13	North Ave. and Washington St.	"	Bentzel and Foley.
14.	Park Heights Ave.	"	New and Bond.
15.	Ninth and Northwest Sts.	"	Gatch and New.
16.	25th St., near Charles.	"	Bond and Taneyhill.
17.	Old Frederick road and Fairview Ave.	"	New and Gatch.
18.	Linden Ave. and Konig St.	"	New and Taneyhill.
19.	Church St., near Merryman's lane	"	Bond and Foley.
20.	North Ave. and Payson St.	"	Bond and Isaacs.
21.	North Walbrook	"	Gatch and Bond.
1.	Colored—Merryman's lane	"	Bond and New.
2.	Colored—Calverton road and Edmondson Ave	"	New and Isaacs.
3.	Colored — Frederick road, near tollgate	"	Carter and New.

NIGHT SCHOOLS.

Bohemian	Bond St. and Ashland Ave.	Messrs.	Schuch and Brady.
1.	N. E. Cor. Greene and Fayette Sts.	"	Muller and Faupel.
2.	Bank St. and Broadway	"	Horst and Griffin.
5.	Greenmount Ave. and Eager St.	"	Foley and Brady.
8.	Hollins St., near Fulton Ave.	"	Carter and Gatch.
11.	Washington St., near Fayette	"	Schuch and Griffin.
12.	Ridgely St., near Fremont	"	Wacker and Jones.
17.	Light and Poultney Sts.	"	Heintzeman and Jones.
1.	Colored — Saratoga St., near Charles	"	Dix and Sheehan.
3.	Colored—Howard and Montgomery St.	"	Heintzeman and Jones.
4.	Colored—Biddle St., near Pennsylvania Ave	"	Taneyhill and Isaacs.
7.	Annex—Woodberry Ave., near Hooper Ave	"	New and Bond.

STANDING COMMITTEES.

1.—Baltimore City College.

Messrs. Muller, Griffin, Foley, Bond, President and Superintendent.

2.—Female High Schools.

Messrs. Gatch, Taneyhill, Carter, Griffin, Bond, Horst, President and Superintendent.

3.—Grammar Schools.

Messrs. Bond, Wacker, Faupel, Brady, Carter, President and Superintendent.

4.—Primary Schools.

Messrs. Esslinger, Gatch, Valentini, Sheehan, Heintzeman and Assistant Superintendent.

5.—English-German Schools.

Messrs. Isaacs, Bentzel, Horst, Brady and Esslinger.

6.—Polytechnic Education.

Messrs. Gatch, Bond, Sheehan, Muller, Hiss, Horst, President and the Mayor.

7.—Colored Schools.

Messrs. Bentzel, Schuch, Dix, Jones, Wacker and Superintendent.

8.—Normal Schools.

Messrs. Taneyhill, Isaacs, Carter and Superintendent.

9.—Text Books.

Messrs. Griffin, Muller, Foley, Taneyhill, Dix, President, Superintendent and Assistant Superintendent.

10.—Furniture.

Messrs. Bond, Griffin, Hiss, Heintzeman and Brady.

11.—Music.

Messrs. Bond, Muller, Valentini, Jones and President.

12.—Discipline.

Messrs. Muller, Esslinger, Horst, Bond, Sheehan, President, Superintendent and Assistant Superintendent.

13.—Accounts.

Messrs. Bond, Muller, Foley, Bentzel and Horst.

14.—Expenditures.

Messrs. Gatch, Esslinger, Sheehan, Wacker, Dix and President.

15.—Examinations.
Messrs. Taneyhill, Dix, Valentini, President, Superintendent and Assistant Superintendent.

16.—Bi-Weekly Reports.
Messrs. Shuch, Wacker and Sheehan.

17.—Conference.
Messrs. Gatch, Isaacs, Horst, Wacker and Carter.

18.—Buildings.
Messrs. Esslinger, Muller, Jones, Schuch, Wacker, President, Superintendent and Assistant Superintendent.

19.—Printing.
Messrs. Foley, Gatch and Faupel.

20.—Health.
Messrs. Taneyhill, Valentini and Jones.

21.—Drawing.
Messrs. Heintzeman, Faupel, Sheehan, Isaacs and Carter.

22.—Intestates' Estates.
Messrs. Griffin, Fauuel and Brady.

23.—Heating Apparatus and Fuel.
Messrs. Isaacs, Bond, Sheehan, Hiss, Bentzel and President.

24.—Rules.
Messrs. President, Griffin and Brady.

25.—Public School Library.
Messrs. Heintzeman, Jones, Dix, Carter and President.

26.—Non-Resident Pupils.
Messrs. Griffin, Jones and Bond.

27.—Half-Time Schools.
Messrs. Hiss, Faupel, Valentini, President, Superintendent and Assistant Superintendent.

28.—Night Schools.
Messrs. President, Gatch, Horst, Wacker and Jones.

29.—Sewing.
Messrs. Esslinger, Gatch, Carter, Griffin, Foley, President, Superintendent and Assistant Superintendent.

30.—Physical Training.
Messrs. Taneyhill, Bond, Brady, Carter and President.

REPORT

—OF THE—

BOARD OF COMMISSIONERS OF PUBLIC SCHOOLS

OF BALTIMORE.

OFFICE OF THE COMMISSIONERS OF PUBLIC SCHOOLS,
CITY HALL,
BALTIMORE, January 1, 1899.

To the Honorable the Mayor and City Council of Baltimore:

The Board of Commissioners of Public Schools of Baltimore City respectfully presents its

SEVENTIETH ANNUAL REPORT,

covering its transactions for the past year, with account of receipts and expenditures, and the estimated amount necessary for the expense of the Schools for the year 1899.

The itemized reports, which follow, of the Secretary, Committee on Accounts, Superintendent of Supplies and Superintendents of Instruction, give full information of the work in their respective departments and show considerable improvement in each department.

The Committee on Health has continued its good work of the previous year, and made many suggestions for the improvement of the sanitary condition of the schools, which were adopted by the Board and through the kind and prompt co-operation of the genial Inspector of Buildings many of the evils which

threatened the health of the children were corrected and many of the school buildings improved with modern sanitary appliances. Your support is therefore asked for a very liberal appropriation to the Inspector of Buildings, so that the work of putting all schools in the best possible sanitary condition may be continued.

The following classified statistics show the number of schools of the various grades to be 199; the number of teachers, 1,915; the number of pupils, 67,790, and the average attendance in the various grades, 54,683. The number of special teachers included in the above is 63, of whom 21 are teachers of drawing, 30 teachers of sewing, 2 superintendents of music, physical culture 10. Four new schools were established during the year, with 18 teachers, and 738 pupils were enrolled at the end of the year, with an average attendance of 729.

The number of non-resident pupils now in the schools is 258. The total number in the schools during some portion of the year, 321, being 35 more than in 1897; and the amount received from said non-residents for books and tuition was as follows:

From Baltimore Polytechnic Institute	$884 25
" Baltimore City College	938 50
" Female High Schools	396 00
" Male Grammar Schools	775 45
" Female Grammar Schools	592 20
" Male Primary Schools	96 50
" Female Primary Schools	69 00
" English-German Schools	32 00
" Colored Schools	59 00
" Annex Schools	721 65
	$4,544 55
More than receipts in 1897	755 12

SCHOOL STATISTCIS.

BALTIMORE CITY COLLEGE.

Number of schools	1
Number of teachers	16
Number of pupils on roll December 31, 1898	664
Average number on roll during the year	631
Average attendance	595
Percentage of attendance	94

FEMALE HIGH SCHOOLS.

Number of schools	2
Number of teachers	30
Number of pupils on roll December 31, 1898	1,125
Average number on roll during the year	1,064
Average attendance	974
Percentage of attendance	91½

COLORED HIGH SCHOOL.

Number of schools	1
Number of male teachers	1
Number of female teachers	6
Number of pupils on roll December 31, 1898	167
Average number on roll during the year	157
Average attendance	148
Percentage of attendance	94

BALTIMORE POLYTECHNIC INSTITUTE.

Number of schools	1
Number of teachers	20
Number of pupils on roll December 31, 1898	508
Average number on roll during the year	484
Average attendance	459
Percentage of attendance	94

GRAMMAR SCHOOLS.

Number of schools	41
Number of male teachers	37
Number of female teachers	417
Number of pupils on roll December 31, 1898	15,162
Average number on roll during the year	14.509
Average attendance	12,981
Percentage of attendance	88

PRIMARY SCHOOLS.

Number of schools	78
Number of female teachers	608
Number of pupils on roll December 31, 1898	21,889
Average number on roll during the year	21,945
Average attendance	18,222
Percentage of attendance	83

ENGLISH-GERMAN SCHOOLS.

Number of schools	7
Number of male teachers	20
Numbers of female teachers	165
Number of pupils on roll December 31, 1898	7,151
Average number on roll during the year	7,028
Average attendance	6,286
Percentage of attendance	88

ANNEX SCHOOLS.

Number of schools	27
Number of male teachers	17
Number of female teachers	231
Number of pupils on roll December 31, 1898	9,260
Average number on roll during the year	8,839
Average attendance	7,324
Percentage of attendance	83

COLORED POLYTECHNIC INSTITUTE.

Number of schools	1
Number of male teachers	7
Number of Pupils on roll December 31, 1898	99
Average number on roll during the year	92
Average attendance	85
Percentage of attendance	86

COLORED SCHOOLS (GRAMMAR AND PRIMARY).

Number of schools	24
Number of male teachers	36
Number of female teachers	190
Number of pupils on roll December 31, 1898	9,152
Average number on roll during the year	8,493
Average attendance	6,659
Percentage of attendance	79

NIGHT SCHOOLS.

Number of schools	16
Number of male teachers	62
Number of female teachers	26
Number of pupils on roll December 31, 1898	2,620
Average number on roll during the year	2,268
Average attandance	1,152
Percentage of attendance	50

The average salary of the teachers was $556.57, the per capita cost per pupil was $21.74, and in the several grades was as follows:

Baltimore City College	$55 62
Female High Schools	33 15
Male Grammar Schools	23 15
Female Grammar Schools	19 55
English-German Schools	17 27
Male Primary Schools	17 12
Female Primary Schools	16 63
Baltimore Polytechnic Institute	66 51
Colored Polytechnic Institute	94 48
Colored High School	54 73
Colored Grammar and Primary Schools	15 47
Annex Schools	18 99
Average for all	21 74

Respectfully submitted.

HENRY F. NEW, *President.*

IN MEMORIAM.

It is again our sad duty to announce the death of several experienced and successful teachers, some of whom have been connected with our schools for many years. They conscientiously and faithfully performed their work and won the respect and affection of their pupils.

We appreciated their devotion to duty and will always remember them as useful co-workers in the cause of public education.

Anna M. Lovering, Assistant in Female Grammar No. 7. Died February 2, 1898.

Mary E. O'Brien, Assistant in Male Grammar No. 13. Died Februry 7, 1898.

Elizabeth J. McAllister, Assistant in Male Primary No. 20. Died April 12, 1898.

Ralph L. Williams, Assistant Baltimore Polytechnic Institute. Lost at sea July 4, 1898. (Steamship La Bourgogne went down with nearly all on board).

Edward E. Singer, Assistant in Male Grammar No. 15. Died September 6, 1898.

Henry B. Harris, Assistant in Male Colored No. 9. Died September 6, 1898.

Agnes E. Onion, Assistant in Male Primary No. 28. Died October 4, 1898.

Nancy L. Jones, Teacher of Drawing. Died October, 1898. Date not given.

ANNUAL REPORT

—— OF THE ——

COMMITTEE ON ACCOUNTS.

BALTIMORE, January 17, 1899.

To the Board of Commissioners of Public Schools:

GENTLEMEN: As prescribed by the rules of this Board, one of the duties of the Committee on Accounts is to audit all bills against the Board and certify to their correctness.

We respectfully report that in the performance of that duty we have audited during the past year bills amounting to $250,845.55, in which amount are included bills for books for white and Colored schools amounting to $62,924.19, thus leaving $187,921.36 as the actual amount spent for all other expenses of this departmet, exclusive of salaries.

Of the total amount spent for books, $62,924.19, the bills for the white schools aggregated $55,521.76, and the colored schools, $7,402.43.

The total amount paid out for salaries this year was $1,124,538.06; adding this to the amount of expenses, $250,845.55, shown above, makes the total $1,375,383.61, which represents the total expenses of this department for the twelve months ending December 31, 1898.

Another duty is to examine the accounts of the Secretary of the Board. This duty has been per-

formed and we find that he has received: As fees from non-resident pupils, $4,544.55; from intestate estates, $562.82; from sales of old material, $98.63; from teachers furnishing no substitutes and other refundments, $474.77, and from other miscellaneous sources, $123.27, making a total of $5,804.04, all of which he has paid over to the City Register, as shown by the receipt of that officer.

In compliance with the custom of several years past, this committee has examined and past upon the estimated requirements of the schools for the year ending December 31, 1899. We submit the following figures:

ESTIMATES FOR THE EXPENSES FOR THE YEAR 1899.

For general salaries (office, etc.)	$14,420 00	
For general expenses	1,500 00	
For expenses, day schools, city	161,081 00	
For salaries, day schools, city	993,744 00	
For salaries, night schools	17.849 00	
For expenses, night schools	600 00	
		$1,189.194 00
For salaries, day schools, Annex	$150,320 00	
For expenses, day schools, Annex	30,795 00	
		181,115 00
For free text-books, white		15,000 00
Total		$1,385,309 00

The expenditures for school purposes must, of course, vary largely from year to year, and after examining the expenditures of past years, noting the usual annual increase, and investigating the causes which have caused such increase, not only the increase in the number of teachers and pupils, increase in rents, increase for books and stationery, for new furniture, etc., etc., we have fixed our estimates at the above amounts, which, we think, will be required for the different accounts.

The item of $15,000 for free text-books, we think, will be required this year to enable the different schools to be supplied with the proper number of text-books needed, the usual appropriation by the State being found insufficient for that purpose. Last year the state appropriation was also found insufficient, and the city gave us an appropriation for the purpose of $8,000.

The Commissioners will notice that our estimates this year are shown differently from those of preceding years, for the reason that the City Comptroller has decided to merge the accounts of the white and colored polytechnic institutes in the general account of day and night schools, city. The Comptroller has also opened three new accounts, viz.: General salaries, office, etc.; general expenses, offices, etc., and expenses, night schools.

We sincerely trust the Board of Estimates will give us what we ask, as our estimates were carefully made, and only actual needs asked for.

Respectfully submitted.

HARRY K. MULLER,

Chairman of Committee on Accounts.

Secretary's Statement

—OF—

ESTIMATES, EXPENDITURES, ETC., ON ACCOUNT OF PUBLIC SCHOOLS IN 1898.

The estimates made by the Board for the current expenditures for school purposes for the year 1898 were as follows:

For salaries, not including the Baltimore Polytechnic Institute, nor the Colored Polytechnic Institute, nor Night Schools, in first twenty wards	$1,000,000 00
For items other than salaries in first twenty wards, excluding as above	178,800 00
For Baltimore Polytechnic Institute	38,000 00
For the Colored Polytechnic Institute	11,837 00
For Night Schools	15,000 00
For salaries in the Annex Schools	146,000 00
For other items in the Annex Schools	29,700 00
For free text-books, white	10,000 00
Total	$1,429,337 00

In making the appropriation the Mayor and City Council reduced the above amount to the extent of $72,637.

The items from which these reductions were made were the following:

From city salaries	$30,000 00
From city expenses, including rents, books, heating, furniture, fuel, repairs and incidentals, first twenty wards	28,800 00
From Night Schools	5000 00
From Baltimore Polytechnic Institute	4500 00
From Colored Polytechnic Institute	2,337 00
From free text-books, white	2,000 00
Total	$72,637 00

THE FOLLOWING STATEMENTS SHOW THE AMOUNTS APPROPRIATED AND EXPENDED FOR THE ITEMS NAMED:

Salaries—First Twenty Wards:

Appropriated	$970,000 00
Expended	939,815 95
Unexpended	$30,184 05

Other than Salaries—First Twenty Wards:

Appropriated	$150,000 00
Expended	149,925 63
Unexpended	$74 37

Baltimore Polytechnic Institute:

Appropriated	$33,500 00
Expended	32,296 57
Unexpended	$1,203 43

Colored Polytechnic Institute:

Appropriated	$9,500 00
Expended	9,353 85
Unexpended	$146 15

Night Schools—First Twenty Wards:

Appropriated	$10,000 00
Expended	9,407 13
Unexpended	$592 87

Annex Schools—Salaries Twenty-first and Twenty-second Wards:

Appropriated	$146,000 00
Expended	143,292 70
Unexpended	$2,707 30

Annex Schools—Other than Salaries:

Appropriated	$29,700 00
Expended	28,367 59
Unexpended	$1,332 41

Total in First Twenty Wards:

Total appropriations	$1,173,000 00
Total expenditures	1,140,769 13
Unexpended	$32,230 87

Total in Annex Schools:

Total appropriations	$175,700 00
Total expenditures	171,690 29
Unexpended	$4,009 71

Special Appropriation—For Free Text-Books, White:

Appropriated	$8,000 00
Expended	8,000 00
Balance	$.....

Totals for all the Schools:

Amount appropriated	$1,356,700 00
Amount expended	1,320,459 42
Unexpended	$36,240 58

The above is exclusive of the amounts received from the State as the city's apportionment of the $150,000 appropriated as the Free Book Fund, to be expended *for books only.*

Balance on hand for White Schools January 1, 1898	$2,314 37
Amount appropriated by the city	8,000 00
Amount to credit of Intestate Estates and used for books for White Schools	1,986 41
The amount received on account of White Schools for 1898-9 was	47,994 00
Total	$60,294 78
The amount expended on account of White Schools was.	55,521 76
Unexpended as of January 1, 1899	$4,773 02
Balance on hand for Colored Schools January 1, 1898	$5,731 80
The amount received on account of Colored Schools for 1898-9 was	5,697 56
Total	$11,429 36
The amount expended on account of Colored Schools was.	7,402 43
Unexpended as of January 1, 1899	$4,026 93

The above apportionment made by the State (with the balances as of January 1, 1898,) is intended to cover the twelve months commencing August 1, 1898, and ending July 31, 1899.

EXPENDED BY THE INSPECTOR OF BUILDINGS ON ACCOUNT OF NEW BUILDINGS AND IMPROVEMENTS AND REPAIRS OF OLD BUILDINGS.

In the First Twenty Wards:

For general repairs		$49,999 50
On Baltimore City College, new		62,105 54
On Western Female High School, new		5,257 45
On Primary No. 4, new		1,290 41
On Colored No. 9, new		556 00
On Grammar No. 7, new		37,774 56
		$157,283 46

In Twenty-first and Twenty-second Wards:

For general repairs	$3,000 00	
On Female Annex No. 3, new	1,110 52	
On Female Annex No. 18, new	3,892 81	
		$8,003 33
By the Inspector of Buildings		$165,286 79
By the School Board (for total expenses of School Board)		1,375,383 61
By the School Board and Inspector of Buildings		$1,540,670 40

RECEIPTS FOR THE CURRENT EXPENSES OF THE BOARD

From the City Collector, taxes	$1,117,085 06
" the State Treasurer, taxes	261,763 60
" non-resident pupils	4,544 55
" intestate estates	562 82
" sales of old material	98 63
" teachers furnishing no substitutes, and other refundments	474 77
" other miscellaneous sources	123 27
	$1,384,652 70

NON-RESIDENT PUPILS.

The number of non-resident pupils now in the schools is 258. The total number in the schools during some portion of the year, 321, being 35 more than in 1897.

The amount received from non-residents		$4,544 55
From Baltimore Polytechnic Institute	$884 25	
" Baltimore City College	938 50	
" Female High Schools	376 00	
" Male Grammar Schools	775 45	
" Female Grammar Schools	592 20	
" Male Primary Schools	96 50	
" Female Primary Schools	69 00	
" English-German Schools	59 00	
" Colored Schools	32 00	
" Annex Schools	721 65	
		$4,544 55
More than receipts in 1897		$755 12

The fees for non-residents are as follows:

In Baltimore City College	$50	per annum, payable quarterly.
In Polytechnic Institutes	50	" "
In Female High Schools	32	" "
In all Grammar Grades	16	" "
In all Primary Grades	12	" "

The fees are payable in advance. Quarters commence: First quarter, September 1; second quarter, November 21; third quarter, February 11; fourth quarter, April 26.

The average salary of teachers of 1898 was $556.57.

PER CAPITA TAX.

The cost per pupil, including all the day schools under the control of this Board, based

1st. On the December, 1898, enrollment and the expenditure for Books and Stationery.

2d. On the December, 1898, enrollment and the total current expenses paid by the School Board, including Books and Stationery, were as follows:

	For Books.	*For Stationery.*	*For Current Expenses.*
In Baltimore City College	$2 13	48	$55 62
In Female High Schools	2 31	25	33 15
In Male Grammar Schools	1 36	44	23 15
In Female Grammar Schools	1 35	34	19 55
In English-German Schools	86	27	17 27
In Male Primary Schools	55	77	17 12
In Female Primary Schools	53	23	16 63
In Baltimore Polytechnic Institute	2 55	21	66 51
In Colored Polytechnic Institute	3 65	..	94 48
In Colored High School	2 25	39	54 73
In Colored Grammar and Primary Schools.	73	21	15 47
In Annex Schools	1 10	37	18 99
Average for all	85	31	21 74

STATE TAX.

Amount of school tax paid by the city to the State	$344,002 15
Amount of school tax received by the city from the State	261,763 60
Excess to the State	$82,238 55

SCHOOL BUILDINGS.

Number of school buildings owned by the city	98
Number rented for school purposes	36
Total number used for school purposes	134

The following tables show:

Table showing amounts appropriated, expended, balances, etc.

Table B—Summary of the itemized expenditures of the several grades of schools.

Table showing condition of Free Text-Book Fund as of January 1, 1899.

Table accompanying the Superintendent's report, showing the number of teachers, number of pupils on roll, average attendance, etc.

Table D—Showing rented buildings and rents paid.

Table A—Showing amounts expended each month during the year ending December 31, 1898.

CHARLES F. BENDER, *Secretary.*

TABLE SHOWING AMOUNTS APPROPRIATED, EXPENDED, BALANCES, ETC.

ITEMS.	APPROPRIATED.	EXPENDED.		TOTALS.	UNEXPENDED.	OVERDRAWN
		White Schools.	Colored Schools.			
Salaries, city	$970,000 00	$812,393 35	$127,422 60	$939,815 95	$30,184 05	
Expenses, city	150,000 00	128,651 67	21,299 86	149,951 53	48 47	
Night Schools	10,000 00	9,405 13		9,405 13	594 87	
Baltimore Polytechnic Institute	33,500 00	32,296 57		32,296 57	1,203 43	
Colored Polytechnic Institute	9,500 00		9,353 85	9,353 85	146 15	
Free Text-Books, White	8,000 00	8,000 00		8,000 00		
Totals, city	$1,181,000 00	$990,746 72	$158,076 31	$1,148,823 03	$32,176 97	
Salaries, Annex	$146,000 00	$138,719 60	$5,573 10	$143,292 70	$2,707 30	
Expenses, Annex	29,700 00	27,405 15	992 44	28,397 59	1,302 41	
Totals, Annex	$175,700 00	$166,124 75	$6,565 54	$171,690 29	3,009 71	
Grand totals	$1,356,700 00	$1,156,871 47	$164,641 85	$1,321,513 32	$35,186 68	

TABLE SHOWING CONDITION OF FREE TEXT-BOOK FUND AS OF JANUARY 1, 1899.

	White Schools.	Colored Schools.	Total.
Balance on hand January 1, 1898	$2,314 37	$5,731 80	$8,046 17
From Intestate Estate Fund (available for the year 1898)	1,986 41	.....	1,986 41
From city appropriation (available for the year 1898)	8,000 00	.....	8,000 00
Amount received during the year of 1898 from the State as the city's apportionment of the State's appropriation of $150,000 for Free Book Fund	47,994 00	5,697 56	53,691 56
Total	$60,294 78	$11,429 36	$71,724 14
Amount expended during the year 1898	55,521 76	7,402 43	62,924 19
Unexpended, as of January 1, 1899	$4,773 02	$4,026 93	$8,799 95

TABLE B—Showing the Itemized Expenditures for Each School.*

Schools.	Salaries.	Rents.	Stationery.	Heating Apparatus and Repairs.	Furniture.	Fuel.	Repairs and Cleaning.	Advertising, Printing and Incidentals.	Free Text-Books.	Sewing.
Public School Library.	$900 00	$225 00	$19 21	$14 00	$10 60	$29 08	$3 85	$258 74	.....	.....
General expense.....	16,520 00	.....	210 98	15 50	163 20	.....	44 43	6,843 16	.....	.....
Drawing.....	8,903 15	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sewing.....	14,663 00	.....	.....	.....	.....	.....	.....	73	.....	.....
Baltimore City College	35,253 00	.....	318 85	77 98	18 65	581 90	433 76	563 89	$1,345 86	.....
Eastern Female High.	14,343 00	.....	181 59	499 52	196 43	386 60	277 23	262 99	842 71	.....
Western Female High.	17,668 00	.....	107 60	31 01	689 80	328 06	242 39	348 34	1,610 52	.....
Physical training.....	5,632 85	.....	.....	.....	.....	.....	.....	1 75	15 48	.....
Warehouse.....	.....	494 94	73 28	74 31	2540 26	17 22	71 50	2,886 37	.....	.....
	$113,883 00	$719 94	$914 51	$712 32	$3918 94	$1342 86	$1,073 16	$11,165 97	$3,814 57	.....
Male Grammar No. 1	$5,844 00	.....	$186 96	$295 18	$232$01	$198 35	$290 71	$83 65	$482 92	.....
" " " 2	8,925 50	$300 00	247 65	52 12	407 29	280 68	177 58	97 98	545 26	.....
" " " 3	3,938 00	.....	52 69	73 52	88 13	90 00	69 32	69 76	283 75	.....
" " " 4	6,748 35	261 00	173 92	37 36	71 80	151 81	62 24	70 36	765 40	.....
" " " 5	5,626 00	.....	99 39	44 80	349 80	17 00	168 94	205 07	359 02	.....
" " " 6	6,984 00	.....	66 07	49 36	180 84	303 86	337 70	118 76	209 46	.....
" " " 7	7,915 40	350 00	127 43	94 71	3,770 27	278 88	284 72	495 71	725 09	.....
" " " 8	7,532 60	425 00	75 43	308 95	26 74	273 40	338 31	14 81	660 57	.....
" " " 9	3,806 25	540 00	18 00	18 12	84	74 85	42 45	53 30	222 54	.....
" " " 10	8,123 90	180 00	233 67	77 50	281 78	150 04	352 55	109 60	499 87	.....
" " " 11	6,789 00	.....	167 71	262 62	10 30	217 53	220 77	38 15	486 85	.....
" " " 12	6,832 45	.....	123 95	620 67	98 00	301 68	132 98	87 40	479 34	.....

Male Grammar	No. 13	$3,769 80	.....	$68 09	$37 00	$251 05	$65 80	$120 84	$74 07	$431 20	.....	
" "	" 15	8,377 50	.....	405 97	498 70	262 02	344 10	336 89	118 16	656 95	.....	
" "	" 16	6,957 15	.....	190 48	104 10	52 84	243 46	274 09	199 31	283 47	.....	
" "	" 17	6,591 50	.....	85 78	60 03	187 80	106 80	69 54	84 70	465 05	.....	
" "	" 18	6,253 25	.....	226 35	246 65	402 52	223 05	295 89	54 80	795 50	.....	
" "	" 19	7,602 65	.....	204 04	2 94	237 24	132 35	42 42	98 79	442 67	.....	
" "	" 20	10,206 00	$375 00	250 90	87 01	80 57	357 18	212 71	70 87	796 42	.....	
" "	" 21	6,712 00	.....	177 45	51 67	17 76	166 87	160 62	69 14	409 26	.....	
" "	" 22	4,933 70	.....	78 69	154 59	38 63	257 90	163 47	76 25	263 40	$9 83	
Totals	.....	$140,469 00	$2,434 00	$3,260 62	$3,177 60	$7048 23	$4535 57	$4,154 65	$2,290 64	$10,263 99	$9 83	
Female Grammar	No. 1	$5,376 00	.....	$50 70	$65 35	$22 46	$237 32	$346 68	$126 07	$393 39	$33 18	
" "	" 2	7,018 60	$180 00	249 11	36 13	881 06	295 67	186 81	162 45	603 89	57 73	
" "	" 3	3,265 00	.....	22 52	13 10	271 96	103 40	33 85	46 81	208 58	18 22	
" "	" 4	5,466 10	.....	102 45	29 25	77 97	151 80	52 60	99 20	404 85	20 27	
" "	" 5	4,672 00	.....	130 90	43 00	163 92	191 20	193 64	197 62	327 27	35 70	
" "	" 6	6,635 00	.....	121 71	104 80	284 21	303 87	317 57	166 63	560 87	37 62	
" "	" 7	6,888 20	200 00	53 17	141 80	3,843 36	226 12	159 17	363 44	753 51	53 63	
" "	" 8	6,910 25	50 00	90 56	260 30	76 91	273 40	113 97	27 30	607 57	36 42	
" "	" 9	3,127 85	600 00	75 32	28 25	6 34	65 63	30 95	35 18	216 24	11 14	
" "	" 10	7,093 50	300 00	277 17	21 90	327 88	150 05	349 63	163 09	583 52	22 75	
" "	" 11	6,399 65	.....	182 52	262 61	23 46	217 52	155 19	40 58	580 59	29 97	
" "	" 12	5,844 60	.....	112 55	1,025 61	221 77	301 68	164 69	99 64	454 45	33 89	
" "	" 13	4,780 70	.....	100 02	56 67	192 40	71 80	98 58	51 06	480 97	20 22	
" "	" 15	8,463 25	.....	273 75	316 40	99 88	301 60	206 15	84 05	1,003 65	45 28	
" "	" 16	6,196 00	.....	143 43	266 92	163 39	254 46	142 79	170 42	397 99	20 65	
" "	" 17	5,301 40	.....	104 59	67 77	161 16	124 79	57 60	51 17	431 61	42 42	
" "	" 18	5,882 00	.....	61 86	244 15	82 70	223 05	259 50	77 41	482 42	33 15	
" "	" 19	6,488 00	.....	150 18	2 95	224 98	132 35	25 12	145 92	482 83	54 36	
" "	" 20	10,397 00	375 00	269 15	83 99	117 09	357 16	208 55	51 89	981 18	70 37	
" "	" 21	6,204 50	.....	88 98	244 82	3 25	166 88	101 73	54 78	425 28	51 50	
Totals	.....	$122,409 60	$1,705 00	$2,660 64	$3,315 77	$7246 15	$4149 75	$3,204 77	$2,214 71	$10,380 66	$728 47	

TABLE B—Continued.

Schools.	Salaries.	Rents.	Station-ery.	Heating Appa-ratus and Repairs.	Furni-ture.	Fuel.	Repairs and Cleaning.	Advertising, Printing and Incidentals.	Free Text-Books.	Sewing.
English-German No. 1.	$8,703 10	.....	$148 29	$66 90	$420 30	$170 00	$137 11	$102 25	$455 82	$24 21
" " 2.	16,511 00	.....	305 01	842 13	830 08	493 96	367 59	190 40	916 68	34 22
" " 3.	23,304 80	$675 00	490 30	189 75	98 74	373 42	392 28	192 40	1,245 04	47 79
" " 4.	18,945 35	.....	302 64	153 00	251 35	482 05	586 58	106 99	1,136 09	36 93
" " 5.	16,651 25	.....	134 93	83 41	41 75	566 15	206 14	23 98	1,586 51	23 09
" " 6.	16,347 65	750 00	285 07	458 35	206 00	799 25	275 77	60 95	1,412 78	26 23
" " 7.	7,714 45	1,233 75	240 87	105 23	236 87	76 30	628 34	98 80	451 04	22 54
	$108,177 60	$2,658 75	$1,907 11	$1,898 77	$2,085 09	$2,961 13	$2,593 81	$775 77	$7,203 96	$215 01
Male Primary No. 1.	$4,308 00	$193 75	$56 03	$44 60	$80 00	$206 97	$391 45	$54 62	$156 12	.....
" " " 2.	3,239 00	.....	28 33	44 70	33 50	74 71	43 50	32 33	164 71	.....
" " " 3.	5,931 00	600 00	77 87	104 01	123 61	110 50	86 43	59 42	157 41	.....
" " " 4.	4,038 00	.....	33 14	59 00	740 05	140 97	53 99	198 99	15 46	.....
" " " 5.	6,179 25	.....	189 66	252 54	182 50	184 88	150 83	50 65	226 18	.....
" " " 6.	5,175 65	112 50	60 80	107 10	222 63	77 73	221 43	229 68	208 03	.....
" " " 7.	2,779 25	.....	65 92	229 56	59 55	105 25	124 70	40 60	116 13	.....
" " " 8.	3,764 00	.....	87 62	31 55	2 90	108 42	45 03	18 89	145 59	.....
" " " 10.	2,370 40	.....	56 01	46 82	12 04	57 66	69 78	42 89	81 13	.....
" " " 11.	7,664 00	.....	112 53	608 61	145 04	315 69	427 84	70 32	489 02	.....
" " " 12.	5,134 95	262 50	55 30	108 22	67 74	115 93	172 52	89 04	123 04	.....
" " " 13.	3,300 00	.....	27 71	50 00	25 61	181 43	78 58	1 00	117 48	.....
" " " 14.	4,655 25	.....	69 66	137 80	196 70	201 58	84 77	24 58	235 38	.....
" " " 15.	5,135 25	.....	91 20	32 75	7 00	101 92	79 43	120 43	170 74	.....
" " " 16.	3,830 25	.....	48 90	254 36	30 95	109 32	197 89	195 71	141 59	.....

Male Primary No. 17..	$4,095 00	.....	$75 12	$1 75	$115 00	$96 46	$299 01	$93 69	$195 17	.....
" " " 18..	3,174 75	.....	35 63	80 05	213 25	87 21	73 67	49 70	104 82	.....
" " " 19..	2,268 00	.....	21 91	81 25	18 41	132 35	20 78	50 55	111 03	.....
" " " 20..	10,822 95	.....	239 13	102 95	190 50	218 40	165 96	26 14	329 46	.....
" " " 21..	4,206 00	.....	44 12	20 30	21 21	96 88	79 63	48 30	132 07	.....
" " " 22..	4,191 75	.....	30 80	36 75	72 09	72 14	37 13	65 07	189 00	.....
" " " 23..	4,634 00	.....	113 32	285 72	90 68	133 25	114 32	28 95	153 54	.....
" " " 24..	4,104 00	.....	61 97	64 50	.....	220 07	29 05	7 78	124 75	.....
" " " 25..	5,303 25	.....	80 13	11 00	45 66	273 50	50 07	3 72	177 16	.....
" " " 26..	2,805 30	.....	22 59	22 50	12 18	60 58	37 07	45 07	63 35	.....
" " " 27..	4,677 50	.....	26 93	27 63	27 19	88 00	89 04	39 51	122 45	.....
" " " 28..	4,500 25	.....	59 57	3 50	13 80	58 50	170 02	79 79	119 04	.....
" " " 29..	2,952 75	.....	69 68	185 87	78 25	116 78	72 64	91 78	148 92	.....
" " " 30..	7,247 25	.....	219 66	46 50	27 50	319 62	470 76	27 70	313 26	.....
" " " 31..	2,940 00	.....	24 33	39 12	26 25	158 55	115 24	47 12	77 82	.....
" " " 32..	4,904 50	$195 00	83 43	27 72	18 60	200 76	339 55	48 69	173 39	.....
" " " 33..	5,232 75	.....	108 14	139 00	585 13	212 14	161 05	51 67	104 71	.....
" " " 34..	3,483 25	.....	65 97	141 30	116 27	229 70	39 03	60 47	118 90	.....
" " " 35..	3,823 50	.....	34 19	35 87	6 99	166 25	162 61	82 02	81 17	.....
" " " 36..	2,832 25	487 50	46 69	45 93	2 00	65 55	39 38	26 47	142 04	.....
" " " 37..	3,352 25	.....	39 65	14 88	52 59	131 03	37 76	5 57	138 01	.....
" " " 38..	3,857 85	350 00	89 41	15 25	27 44	6 24	232 12	19 03	146 99	.....
" " " 39..	2,708 25	.....	28 01	23 12	191 59	120 90	60 79	48 01	44 22	.....
" " " 40..	1,435 25	.....	228 91	9 50	105 35	.....	219 55	20 60	284 70	.....
Totals.....	$167,356 85	$2,201 25	$2,909 97	$3,603 58	$3987 75	$5358 12	$5,347 40	$2,296 55	$6,143 98	.....

TABLE B—Continued.

Schools.	Salaries.	Rents.	Stationery.	Heating Apparatus and Repairs.	Furniture.	Fuel.	Repairs and Cleaning.	Advertising, Printing and Incidentals.	Free Text-Books.	Sewing.
Female Primary No. 1	$4,397 75	.....	$64 94	$8 45	$175 71	$5 48	$180 40	$46 07	$124 47	$14 80
" " " 2	4,113 75	.....	108 26	48 20	178 88	80 71	31 61	48 26	135 51	8 30
" " " 3	6,482 00	.....	67 59	14 01	168 18	110 50	148 95	71 04	247 67	16 47
" " " 4	4,351 65	.....	35 76	54 25	86 66	140 97	158 77	117 47	80 76	10 12
" " " 5	6,579 00	.....	54 39	63 39	263 68	190 87	168 26	70 75	185 45	15 01
" " " 6	5,171 00	$112 50	85 41	107 11	125 28	71 25	190 65	225 09	143 82	20 45
" " " 7	3,266 00	.....	81 92	304 31	27 68	111 25	102 97	29 08	116 90	7 89
" " " 8	2,824 50	.....	70 61	31 55	52 65	114 42	56 11	13 94	72 15	12 05
" " " 10	2,630 50	.....	35 98	18 88	6 99	57 64	15 35	39 85	149 40	10 01
" " " 11	7,270 50	.....	139 05	270 59	19 50	274 31	652 36	46 90	187 22	16 45
" " " 12	4,688 00	37 50	41 63	38 13	85 84	115 92	170 53	50 15	140 10	15 79
" " " 13	3,372 00	.....	24 39	50 00	75 15	181 42	71 20	5 00	99 34	14 82
" " " 14	3,390 00	.....	76 10	165 75	155 50	201 57	88 12	9 42	89 40	10 84
" " " 15	4,719 00	.....	108 09	37 75	.....	101 93	54 04	138 19	393 27	12 13
" " " 16	3,336 00	.....	47 61	254 34	20 40	109 33	144 68	177 85	129 51	5 54
" " " 17	4,205 85	.....	27 33	76 45	.....	82 23	259 21	67 99	136 46	8 07
" " " 18	3,143 00	.....	39 10	.....	175 52	83 47	55 21	59 54	158 56	11 43
" " " 19	2,235 00	.....	35 69	82 75	26 66	132 35	35 36	54 71	56 77	8 85
" " " 20	9,447 00	.....	134 55	79 00	285 72	221 79	192 41	27 45	291 33	29 81
" " " 21	3,867 20	.....	26 15	20 30	7 70	108 37	59 08	44 14	126 66	7 95
" " " 22	4,700 00	.....	36 01	36 75	145 43	72 16	43 62	39 77	224 47	11 16
" " " 23	5,007 25	.....	184 14	293 75	.....	133 25	139 71	83 95	188 40	13 22
" " " 24	4,332 40	.....	98 65	64 50	23 13	207 68	33 59	24 85	161 07	13 81
" " " 25	4,742 60	.....	49 32	41 00	3 36	273 98	31 55	7 73	190 42	9 29
" " " 26	2,764 50	.....	72 22	22 50	8 10	60 57	36 44	41 99	36 85	7 64
" " " 27	4,698 25	.....	35 82	27 62	64 89	82 00	94 66	11 47	128 34	14 65

male Primary No. 28	$4,603 00	.....	$43 05	$64 00	$1 30	$47 49	$234 28	$37 78	$119 84	$11 25
" " " 29	2,940 10	.....	25 06	185 88	105 34	116 78	69 97	77 39	73 55	7 57
" " " 30	6,993 40	.....	167 87	46 50	8 40	319 62	175 49	58 70	331 48	19 39
" " " 31	2,784 00	.....	36 21	39 13	.....	158 55	124 45	60 37	120 26	7 17
" " " 32	4,183 45	$165 00	67 51	27 73	45 29	200 74	316 64	33 14	50 81	13 46
" " " 33	4,301 55	.....	67 93	147 75	68 74	212 43	59 14	43 83	108 51	11 51
" " " 34	3,041 05	.....	45 22	133 65	305 99	229 71	39 37	140 33	91 46	8 42
" " " 35	2,967 00	.....	35 47	39 88	.....	166 24	189 54	79 05	136 91	5 94
" " " 36	2,725 30	412 50	31 57	47 58	.....	59 55	42 95	23 80	145 84	7 36
" " " 37	2,982 75	.....	35 91	14 88	371 09	131 02	25 82	18 33	121 77	8 48
" " " 38	3,409 00	100 00	48 61	40 00	24 09	85 24	265 57	37 31	121 83	12 21
" " " 39	2,065 00	.....	56 29	39 13	129 30	120 90	64 63	55 96	102 74	6 69
" " " 40	1,337 00	.....	107 60	.....	103 41	.....	130 42	2 50	309 10	22 52
Totals.....	$160,097 30	$827 50	$2,549 04	$3,037 74	$3345 56	$5173 69	$4,983 14	$2,221 14	$5,728 39	$468 52

TABLE B—Continued.

Schools.	Salaries.	Rents.	Stationery.	Heating Apparatus and Repairs.	Furniture.	Fuel.	Repairs and Cleaning	Incidentals, Printing, Etc.	Free Text-Books.	Sewing.
Colored High	$8,121 00		$64 95	$43 00	$85 54	$3 70	$47 66	$292 70	$375 54	
Colored Grammar No. 1	$7,450 15	$400 00	$77 56	$12 97		$440 77	$106 46	$55 50	$341 03	$2 97
Male Colored Grammar No. 1	4,224 25		40 40	50 00	$2 50	41 00	2 33	17 40	112 12	
Female Colored Grammar No. 2	611 00		39 68						100 47	6 99
Colored Grammar No. 3	5,353 60		62 95	28 00	6 10	138 35	78 08	111 26	141 88	10 86
Colored Grammar No. 4	1,889 20	366 97	148 36	10 55	26 60	69 32	113 78	68 58	134 17	
	$19,528 20	$766 97	$368 95	$101 52	$35 20	$689 44	$300 65	$252 74	$832 67	$20 82
Male Colored No. 1	$3,043 35	$641 25	$44 46	$42 44	$6 95	$7 45	$47 26	$29 06	$77 46	
" " " 2	3,590 40		103 62	17 30	60 26	75 10	155 61	62 86	115 69	
" " " 3	5,964 60		55 32	33 45	84 84	200 51	48 77	108 96	296 36	
" " " 4	5,551 65	179 00	62 83	87 95	23 96	153 85	88 52	67 55	105 79	
" " " 5	2,684 90		43 79	56 85	42 84	71 75	72 19	31 73	280 06	
" " " 6	3,384 45		37 28	32 52	65 86	91 65	104 34	31 29	108 79	
" " " 7	6,349 90		180 05	234 02	99 64	280 47	213 07	17 08	903 78	
" " " 8	5,055 55	645 00	86 42	52 77		118 65	127 09	100 46	348 56	
" " " 9	9,159 40	225 00	100 06	17 05	75	299 53	80 36	98 48	395 21	
" " " 10	8,211 15	390 00	197 58	58 50	63 15	393 78	50 66	37 33	590 82	$21 16
	$52,995 35	$2,080 25	$911 41	$632 85	$448 25	$1,692 74	$988 17	$584 80	$3,222 52	$21 16

Female Colored No. 1.....	$4,156 80	$20 00	$39 99	$24 94	$16 94	$5 57	$87 21	$4 60	$39 48	$31 73
" " " 2.....	3,546 20	.....	28 20	17 30	29 15	75 10	94 23	48 54	144 60	19 51
" " " 3.....	5,464 95	.....	36 50	33 45	60 59	200 49	71 13	104 47	255 60	17 38
" " " 4.....	5,076 90	139 00	27 60	45 95	23 62	102 85	15 27	40 06	868 82	39 74
" " " 5.....	2,845 20	.....	31 64	5 75	20 97	63 93	47 75	25 91	172 80	7 43
" " " 6.....	3,021 00	.....	50 13	34 53	98 15	91 65	103 78	27 51	165 98	10 75
" " " 7.....	8,030 75	.....	189 82	9 91	22 00	227 36	284 48	12 80	184 22	20 83
" " " 8.....	5,009 25	75 00	126 24	44 28	8 53	118 65	37 09	101 99	211 48	20 01
" " " 9.....	9,627 00	135 00	97 41	17 05	8 50	299 52	79 60	46 21	265 11	24 30
	$46,778 05	$369 00	$627 53	$233 16	$288 45	$1,185 12	$820 54	$412 09	$2,308 09	$191 68

TABLE B—Continued.

Schools.	Salaries.	Rents.	Stationery.	Heating Apparatus and Repairs.	Furniture.	Fuel.	Repairs and Cleaning	Advertising Printing and Incidentals.	Free Text-Books.	Sewing.
Annex No. 1	$4,434 00	$144 00	$93 59	$98 51	$50 81	$39 46	$11 52	$85 81	$377 52	$11 80
" " 2	14,427 25	555 00	223 28	54 95	841 68	312 54	162 34	125 95	828 69	44 53
" " 3 M. G	5,445 40	.....	171 11	.....	469 94	234 15	108 02	88 19	480 17	.....
" " 3 F. G	5,872 40	.....	198 83	16 30	282 20	200 85	39 52	180 51	703 62	45 85
" " 3 Primary	5,280 00	.....	115 38	.....	137 84	110 37	28 68	168 54	276 30	15 29
" " 4	5,642 20	.....	80 12	141 50	36 02	206 24	275 20	25 74	114 56	8 36
" " 5	4,138 40	600 00	47 55	28 00	51 45	174 68	19 10	81 19	178 78	6 48
" " 6	6,082 00	.....	188 54	57 75	61 44	206 24	235 37	25 45	570 16	18 23
" " 7	6,442 00	.....	122 43	59 00	55 24	174 68	156 08	31 21	496 29	20 69
" " 8	13,299 50	.....	275 30	76 15	76 00	525 46	595 00	66 60	728 91	31 38
" " 9	5,725 35	.....	61 82	63 13	18 50	415 27	246 32	49 15	313 77	20 82
" " 10	3,336 50	.....	116 14	30 10	10 49	111 34	47 15	61 57	391 45	14 14
" " 11	8,676 00	.....	186 74	111 25	76 05	481 80	78 47	118 55	561 83	18 43
" " 13	11,577 35	.....	118 29	221 95	109 75	432 52	319 51	153 60	807 68	27 66
" " 14	2,938 75	360 00	86 75	28 25	122 50	10 96	79 08	13 00	185 02	1 76
" " 15	6,664 50	.....	244 47	284 00	170 25	486 34	105 55	163 65	507 95	18 75
" " 16	5,596 25	.....	111 51	424 47	417 84	145 07	82 68	485 23	237 59	.....
" " 17	3,859 00	.....	97 11	83 75	267 32	364 19	86 84	62 45	136 56	8 82
" " 18 M. G	5,273 00	.....	135 18	5 67	928 08	345 21	186 91	161 25	709 68	.....
" " 18 F. G	3,793 20	.....	131 52	5 66	1,027 26	201 46	72 66	45 95	547 04	33 54
" " 18 Primary	3,198 75	.....	171 41	5 67	905 94	201 46	40 38	12 68	43 59	5 63
" " 19	3,606 80	.....	96 01	18 55	12 00	10 96	29 13	35 85	232 06	14 43
" " 20	1,951 00	210 00	143 25	325 22	665 51	115 35	498 12	177 55	372 19	10 70
" " 21	460 00	90 00	144 64	7 50	787 69	128 46	79 79	97 30	422 84	10 38
Totals	$137,719 60	$1,959 00	$3,360 97	$2,147 33	$7581 80	$5635 06	$3,583 42	$2,516 95	$10,224 23	$387 67
Annex No. 1 Colored	$2,458 75	$120 00	$31 20	$17 25	$8 37	$95 56	$42 73	.....	$123 38	$4 49
" " 2 "	1,442 50	225 00	31 25	14 75	.....	157 77	34 74	$12 90	93 98	2 68
" " 3 "	1,671 85	.....	23 63	19 65	.....	4 95	103 58	39 24	80 94	2 70
Totals	$5,573 10	$345 00	$86 08	$51 65	$8 37	$258 28	$181 05	$52 14	$298 30	$9 87
Annex Gen'l Expenses	.....	.....	.....	.....	$88 50	.....	.....	$144 45	.....	.....

TABLE B—Continued.

Schools.	Salaries.	Rents.	Stationery.	Heating Apparatus and Repairs.	Furniture.	Fuel.	Repairs and Cleaning.	Advertising, Printing and Incidentals.	Free Text-Books.
Bohemian Night	$801 00							$10 08	$52 68
Night No. 1	489 50		$ 27					18 00	29 93
Male Night No. 2	1,184 50		2 34					6 53	101 95
Female " " 2	980 50		2 35					6 52	39 43
Night No. 3	732 50								21 86
" " 5	399 00								13 52
" " 8	330 50								
" " 11	475 00		1 95						52 66
" " 12	1,047 00								87 48
" " 17	664 00								63 73
Annex Night No. 7	689 50								
Colored " " 1	521 50								29 13
" " " 3	656 50								
" " " 4	395 00		3 82						
Totals	$9,366 00		$10 73					$41 13	$492 37
Baltimore Polytechnic Ins.	$25,792 51		$107 14		$267 21	$351 90	$155 50	$5,622 31	$1,298 74
Colored " "	6,270 90			$11 45		101 04		2,970 46	336 18

TABLE B—Continued.

Schools.	Salaries.	Rents.	Station-ery.	Heating Appa-ratus and Repairs.	Furni-ture.	Fuel.	Repairs and Cleaning.	Advertising, Printing and Inciden-tals.	Free Text-Books.	Sewing.	Totals.
Annex Schools	$137,719 60	$1,959 00	$3,360 97	$2,147 35	$7,581 80	$5,635 06	$3,583 42	$2,516 95	$10,224 23	$387 67	$175,116 03
Annex Schools, Col'd.	5,573 10	345 00	86 08	51 65	8 37	258 28	181 05	52 14	298 30	9 87	6,863 84
Annex general expense	.....	.....	.....	.....	88 50	.....	.....	144 45	.....	.....	232 95
	$143,292 70	$2,304 00	$3,447 05	$2,198 98	$7,678 67	$5,893 34	$3,764 47	$2,713 54	$10,522 53	$397 54	$182,212 82
Night Schools	$9,366 00	.....	.....	.....	.....	.....	.....	$41 13	$492 37	.....	$9,899 50
Balto. Poly. Inst.	25,792 51	.....	$107 14	.....	$267 21	$351 90	$155 50	5,622 31	1,298 74	.....	33,595 31
Colored Poly. Inst.	6,270 90	.....	.....	$11 45	.....	101 04	.....	2,970 46	336 18	.....	9,690 03
	$41,429 41	.....	$107 14	$11 45	267 21	$452 94	$155 50	$8,633 90	$2,127 29	.....	$53,184 84

TABLE B—Concluded.

SUMMARY OF THE ITEMIZED EXPENDITURES OF THE SEVERAL GRADES OF SCHOOLS

SCHOOLS.	Salaries.	Rents.	Station-ery.	Heating Appa-ratus and Repairs.	Furni-ture.	Fuel.	Repairs and Cleaning.	Advertising, Printing and Inciden-tals.	Free Text Books.	Sewing.	Totals.
Public School Library.	$900 00	$225 00	$19 21	$14 00	$10 60	$29 08	$3 85	$258 74	.....	.....	$1,460 48
General expense.....	16,520 00	.....	210 98	15 50	463 20	.....	44 43	6,843 16	.....	.....	24,097 27
Drawing	8,903 15	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,903 15
Sewing.....	14,663 00	.....	.....	.....	.....	.....	.....	73	.....	.....	14,663 73
Baltimore City College	35,253 00	.....	318 85	77 98	18 65	581 90	133 76	563 89	$1,345 86	.....	38,593 89
Eastern Female High.	14,343 00	.....	184 59	199 52	196 43	386 60	277 23	262 99	842 71	.....	16,993 07
Western Female High.	17,668 00	.....	107 60	31 01	689 80	328 06	212 39	348 31	1,610 52	.....	21,025 72
Physical training.....	5,632 85	.....	.....	.....	.....	.....	.....	1 75	15 48	.....	5,650 08
Warehouse.....	.....	494 94	73 28	74 31	2,540 26	17 22	71 50	2,886 37	.....	.....	6,157 88
	$113,883 00	$719 94	$914 51	$712 32	$3,918 94	$1,342 86	$1,073 16	$11,165 97	$3,814 57	.....	$137,545 27
Male Grammar Schools	$140,469 00	$2,434 00	$3,260 62	$3,177 60	$7,048 23	$4,535 57	$4,154 65	$2,290 61	$10,263 99	$9 83	$177,644 13
Fem. Grammar Schools	122,409 60	1,705 00	2,660 61	3,315 77	7,246 15	4,149 75	3,204 77	2,214 71	10,380 66	728 47	158,015 52
Eng.-German Schools.	108,177 60	2,658 75	1,907 11	1,898 77	2,085 09	2,961 13	2,593 81	775 77	7,203 96	215 01	130,477 00
Male Primary Schools.	167,356 85	2,201 25	2,909 97	3,603 58	3,987 75	5,358 12	5,347 40	2,296 55	6,143 98	.....	199,205 45
Fem. Primary Schools.	160,097 30	827 50	2,519 04	3,037 74	3,345 56	5,173 69	4,983 14	2,221 14	5,728 39	468 52	188,132 02
	$698,510 35	$9,826 50	$13,287 38	$15,033 46	$23,712 78	$22,178 26	$20,283 77	$9,798 81	$39,720 98	$1,421 83	$853,774 12
Total White Schools.	$812,393 35	$10,546 44	$11,201 89	$15,745 78	$27,631 72	$23,521 12	$21,356 93	$20,964 78	$43,535 55	$1,421 83	$991,319 39
Colored High School..	$8,121 00	.....	$61 95	$45 00	$85 54	$3 70	$47 66	$292 70	$375 54	.....	$9,034 09
Colored Gram. Schools	19,528 20	$766 97	368 95	101 52	35 20	689 44	300 65	252 74	832 67	$20 82	22,897 16
Male Colored Schools.	52,995 35	2,080 25	911 41	632 85	448 25	1,692 74	988 17	584 80	3,222 52	21 16	63,577 50
Female Col'd Schools.	46,778 05	369 00	627 53	233 16	288 45	1,185 12	820 54	412 09	2,308 09	191 68	53,213 71
Total Col'd Schools.	$127,422 60	$3,216 22	$1,972 84	$1,010 53	$857 44	$3,571 00	$2,157 02	$1,542 33	$6,738 82	$233 66	$148,722 46
Grand totals.....	$1,124,538 06	$16,066 66	$19,728 92	$18,966 74	$36,435 04	$33,438 40	$27,433 92	$33,854 55	$62,924 19	$2,053 03	$1,375,439 51

TABLE C.

Showing the Location of Schools, Size of Lots, Amount of Ground Rents, Amount Paid on Account of Lots, Size of Buildings, Estimated Value of Buildings and Date of Erection.

Schools.	Location.	Size of Lot.	Amount of Ground Rent.	Amount Paid on Account of Lot.	Size of Building.	Estimated Value of Building.	Date of Erection.
Baltimore City College	Howard, opposite Centre	208^{6} x 260	$4,600 00	$50,000 00	155^{10} x 221^{8}	$203,639	1896
E. F. High School	Aisquith and Orleans	102 x 210	540 90	2,651 50	102 x 56	80,000	1868
	Side lot and rear building	39 x 180	75 00	15,000 00	51 x 58	.....	
W. F. High School	McCulloh and Lafayette avenue	238^{7} x 230	1,188 00	70,666 66	86^{5} x 191^{11}	132,000	1895
Polytechnic Instit'e.	Courtland, near Saratoga (old building)	82 x 90	.....	6,437 75	44 x 90	18,000	1868
	Courtland, near Saratoga (new building)	62^{6} x 90	220 00	10,000 00	54 x 90	25,000	1890
	Courtland, near Saratoga (additional lot)	37^{6} x 90	.....	10,000 00	.....	.....	.....
Male G. and P. No. 1	N. E. corner Fayette and Greene	97 x 102	204 00	9,000 00	83 x 96^{7}	25,000	1880
Female G. and P. No. 1	S. W. " " " "	77^{6} x 170	1,094 75	.....	62 x 140	27,000	1875
Grammar No. 2	Broadway and Bank	100 x 141	244 44	.....	101 x 39	30,000	1888
	Broadway and Bank (rear bldg)	.....	.....	.....	52 x 87	.....	
G. and P. No. 3	High, near Fayette	80 x 167^{8}	900 00	.....	50 x 145	28,800	1875
Grammar " 4	Sharp, near Montgomery	100 x 155	675 00	.....	56 x 85	18,000	1869
" " 5	Greenmount avenue and Eager	66 x 150^{8}	600 00	.....	55 x 100	17,000	1872
" " 6	Division, near Lanvale	104^{2} x 171^{3}	800 00	.....	55 x 120	21,000	1877
Grammar " 7, new	Eastern avenue and Patuxent	145 x 300	1,001 00	.....	80 x 143	50,000	1898
" " 8, old	Hollins, near Monroe	140 x 129	700 00	.....	54 x 112	18,000	1877
" " 8, new	Hollins and Monroe	Old lot.	.....	.....	55 x 104	21,000	1890

Grammar No. 10	William and Warren avenue	70	x 140	$175 00	.....	44	x 103	$13,000	1850
" " 11	Bond and Jefferson	70	x 152[3]	19 00	$8,700 00	56	x 116	20,000	1884
" " 12	Ridgely, near Fremont	124	x 155	620 62	.....	73	x 125	25,000	1877
" " 13	Aisquith, near Lexington	80	x 180	25 00	17,100 00	44	x 100	17,000	1870
Male Grammar No. 15	Carrollton ave., near Lexington	100	x 160[1]	400 00	.....	55	x 107	20,000	1860
Female Grammar No. 15	Carrollton ave. and Lexington	49[6]	x 103	.....	10,000 00	49	x 135	20,000	1886
Grammar No. 16	Hull and Clement (Locust Point)	100	x 155[3]	350 00	.....	56	x 113	18,000	1882
" " 17	Washington, near Fayette	93	x 190	581 25	.....	52	x 119	20,000	1871
" " 18	Harlem avenue and Monroe	85	x 249[6]	830 68	.....	56[4]	x 143[5]	30,500	1893
Gram. and Prim. No. 19	Park avenue and Hoffman	120	x 150	1,020 00	.....	100	x 147	35,000	1892
Grammar No. 20	Eden and Federal	180[6]	x 100	.....	8,000 00	60	x 124	33,000	1890
" " 21	Presstman and Gilmor	102[7]	x 155	620 00	.....	55	x 121	32,000	1876
" " 22	Mulberry, near Fremont	87[8]	x 134	350 67	.....	54	x 85	15,000	1868
Eng.-Ger. " 1, old	Druid Hill avenue, near Biddle	75	x 100	150 00	.....	44	x 100	12,000	1841
† " " 1, new	Pennsylvania ave. and Dolphin	189	x80(110)	1,147 50	.....	56[4]	x 138	26,000	1893
" " 2	Charles and Ostend	74[6]	x 219[2]	372 50	.....	56	x 150	28,000	1882
" " 3	Baltimore, near Aisquith	120	x 170	1,300 00	5,000 00	54	x 118	28,000	1879
" " 4	Chase and McDonogh	80	x 223	501 75	.....	56	x 183[2]	30,500	1882
" " 5	Lexington, near Fremont	81	x 220[6]	.....	15,000 00	60	x 124	25,000	1890
" " 6	Ramsay and Smallwood	178[7]	x 165[9]	.....	4,000 00	53	x 135	36,885	1895
Primary " 2	Gough and Stiles	75	x 92	250 00	3,500 00	32	x 55	9,000	1854
" " 4	Hanover and Lee	105	x 81	270 00	4,000 00	92	x 92	35,000	1896
" " 5	Broadway and Ashland avenue	120	x 120	600 00	.....	60	x 113	24,000	1876
" " 6	Ann, near Canton avenue	63	x 140	157 50	6,800 00	46	x 100	14,800	1878
" " 7	Mullikin, near Aisquith	74	x 100	[illegible]	.....	45	x 65	5,000	1864
" " 8	Caroline, near Lombard	105[7]	x 150	351 34	6,200 00	94[7]	x 59[7]	18,000	1888
" " 10	Hollins, near Schroeder	60[8]	x 134	200 00	.....	46	x 70	6,000	1855
" " 11	Gilmor and Mosher	126[2]	x 156[1 0]	757 00	.....	57[9]	x 104	30,000	1886
	" " " (rear building)	.....		.....		30[7]	x 105[6]	.....	1889
" " 12	Barre and Warner	67	x 120	268 00	.....	55	x 84	16,000	1870
" " 13	Patterson Park ave. and McElderry	155	x 115	530 00	.....	55	x 105	21,000	1890
" " 14	Linden avenue and Wilson	105	x 150	840 00	.....	55	x 117	20,000	1882
" " 15	Saratoga and Carrollton avenue	100	x 150	700 00	.....	50	x 120	19,000	1872
" " 16	Harford and Ashland avenues	105	x 158[7]	790 00	.....	56	x 113	19,000	1876

TABLE C.—Concluded.

Schools.	Location.	Size of Lot.	Amount of Ground Rent.	Amount Paid on Account of Lot.	Size of Building.	Estimated Value of Building.	Date of Erection.
Primary No. 17	Light and Poultney	62¹ x 122	$217 00	$800 00	50 x 72	$10,000 00	1875
" " 18	Argyle avenue, near Lanvale	80 x 140	315 00		45 x 68	13,000 00	1858
" " 20	Eden and Preston	100 x 207	592 00	6,000 00	51 x 167	35,000 00	1868
" " 21	Pennsylvania avenue and Robert	80 x 155	384 00		50 x 80	16,000 00	1869
" " 22	Ramsay, near Scott	71 x 128⁶	177 50		45 x 95	10,000 00	1855
" " 23	Gough and Wolfe	75 x 110	150 00	2,400 00	57⁹ x 104	19,000 00	1886
" " 24	Fait avenue and Patuxent	150 x 100		7,500 00	77 x 86	21,000 00	1890
" " 25	Caroline, near Canton avenue	129⁶ x 110		14,962 50	93 x 90	25,000 00	1892
" " 26	Orleans, near Bond	84 x 75	126 00	4,500 00	50 x 65	15,000 00	1874
" " 27	Fayette and Chester	92 x 120	274 50		48 x 72	18,000 00	1869
" " 28	Battery avenue and Clement	75 x 82	270 00	1,000 00	46 x 82	15,000 00	1869
" " 29	Sharp, near West	114 x 155	570 00		55⁹ x 104	21,600 00	1886
" " 30	Hollins, near Monroe	150 x 129⁶	750 00		55 x 82	16,000 00	1874
" " 31	Schroeder and Pierce	60 x 122	228 00	2,500 00	57⁴ x 102	21,000 00	1890
" " 32	Guilford avenue and Lanvale	80 x 154		11,800 00	67 x 98	21,000 00	1890
" " 33	Light and Clement	100 x 100		10,000 00	67 x 98	21,000 00	1890
" " 34	Carey and Columbia avenue	100 x 160	385 00		113 x 58	30,000 00	1896
" " 35	Hanover and Winder	132 x 198		6,700 00	48⁶ x 114²	28,297 00	1895
" " 37	Biddle and Patterson Park avenue	165 x 150		8,500 00	89 x 61	25,000 00	1896
F. Primary No. 38, old.	Chesapeake and Hudson (Canton)	80 x 100			32 x 50	5,000 00	1853
Primary No. 39	Carrollton and Riggs avenues	97¹ x 157		7,000 00	52¹ x 97⁵	19,000 00	1888
Primary No. 40	Eastern and Montford avenues	100 x 150	350 00		52 x 136	24,000 00	1880
Col. Manual Training.	Fremont, near Lombard	74 x 150		1,200 00	44 x 65	8,000 00	1843
H. & G. & F. C. No. 1	Saratoga, near Charles	66 x 193	600 00	16,000 00	52² x 126³	25,000 00	1888
Colored Grammar " 2	Jefferson, near Caroline	83⁶ x 80	200 00	1,350 00	32 x 80	5,000 00	1855
" " " 3	Howard and Montgomery	50 x 104	120 00	8,000 00	40 x 64	6,000 00	1872

Colored Primary No. 2.	Rogers avenue, near Lexington	75	x	105		$25 00	$5,125 00	49	x	80		$13,000 00	1874
" " " 3.	Hill, near Sharp	99	x	90(155)		192 00	11,300 00	76[9]	x	133[11]		27,000 00	1893
" " " 4.	Biddle, near Pennsylvania avenue	70	x	150		70 00	5,000 00	40	x	92		10,000 00	1870
" " " 5.	Caroline, near Bank	76	x	90		70 00	4,800 00	45	x	65		8,000 00	1867
" " " 6.	Barre, near Eutaw	65	x	112		300 00		40	x	80		10,000 00	1854
" " " 7.	Waesche, near Fremont avenue	143[9]	x	129*		480 00		59	x	120		22,000 00	1877
" " " 8.	Bond and Ashland avenue	80	x	80		130 00		40	x	54		7,000 00	1864
New lot for No. 8.	Ashland avenue and Chester street	133	x	200		959 75[1]							
Colored Primary No. 9.	Carey and Chappell	135[9]	x	142		630 00		109	x	65		40,408 70	1897
Colored Primary No. 10	Girard avenue and Sherman Place	120	x	124			7,200 00	68[5]	x	77[1]		23,968 00	1895
Primary No. —	Summit and Monroe	72[1]	x	245			9,500 00						
Annex No. 1	Homestead, Gorsuch avenue	42	x	90			1,000 00	35	x	50		4,500 00	
" " 2	Waverly, York road	100	x	200			4,000 00	35[6]	x	90		14,500 00	
	Rear building							50	x	33			
" " 3, Male	Oak and Fifth (Twenty-fourth)	60	x	122			4,000 00	50	x	60		10,000 00	
" " 3, Female	St. Paul and Twenty-sixth	100	x	123			10,000 00	100	x	123		60,000 00	1897
" " 4	Chestnut and Fourth avenues	176[8]	x	230			5,000 00[1]	55	x	105		21,000 00	1890
" " 5	Hampden, Merryman's lane	87	x	240[5]			1,000 00	71	x	24		1,000 00	
" " 6	Same as No. 4												
" " 7	Woodberry, on Woodberry avenue	45	x	130		22 50		37	x	96		10,000 00	
" " 8, old	Clifton, on Clifton avenue	40	x	150			2,000 00	40	x	90		4,000 00	
" " 8, new	Francis, near Fulton avenue	150	x	150		480 00		64[1]	x	105		25,000 00	1893
" " 9	Calverton, Bloomingdale road	75	x	169			1,500 00	60	x	100[7]		15,500 00	1893
" " 10	Carroll, old Frederick road	60	x	225*		360 00	2,000 00	52	x	27		4,500 00	
" " 11	Millington avenue and Lehman	80	x	200*		290 00		64	x	119		21,000 00	1892
" " 13	North avenue and Washington	80	x	150			5,000 00	66	x	120		25,000 00	1891
" " 15	N. E. cor. Ninth and Northwest	128	x	194			1,718 66	66[7]	x	106		25,000 00	1894
" " 16	Huntingdon avenue, near Charles	100	x	150			7,000 00					18,000 00	1890
" " 17	Old Frederick rd. & Fairview ave.	150	x	257[5]		360 00		67	x	92		15,000 00	1892
" " 18	Linden avenue and Konig	165	x	150		1,155 00		136[8]	x	70[5]		54,000 00	1897
Annex Colored No. 1	Waverly, Merryman's lane	127[5]	x	32**		50 00		24[9]	x	48		700 00	
" " " 3	Frederick road, near toll-gate	41	x	283[5]		50 00	1,000 00	24	x	108		1,000 00	

*Irregular in form. [1]Occupied by Baltimore City College **House built on the rear of lot leased for E. F. H. School.

Total amount paid on account of lots	$463,412 07
Total value of buildings, actual or estimated	2,400,097 70
Amount of ground rents in the above list	38,354 15

TABLE D.

Showing Locations of Rented Buildings, by What Schools Occupied, and Amounts of Yearly Rentals as of December 31, 1898.

Warehouse, 117 South Frederick street	$499 92
Public School Library, 310 St. Paul street	300 00
*Male and Female Grammar No. 2, 402 and 404 South Bond street	480 00
*Male Grammar No. 8, Frederick avenue and Monroe street	600 00
Male Grammar and Primary No. 9, 808 North Calvert street	540 00
*Male Grammar No. 10, William and Hamburg streets	180 00
*Male Grammar No. 20, Caroline street, near North avenue	300 00
Female Grammar and Primary No. 9, 411 Courtland street	600 00
*Female Grammar No. 10, 125 Warren avenue	300 00
*Female Grammar No. 20, Harford avenue and Federal street	375 00
*English-German No. 3, Baltimore and Aisquith streets	900 00
*English-German No. 6, Lombard and Catharine streets	600 00
English-German No. 7, 117 Jackson Place	670 00
*English-German No. 7, 119 Jackson Place	550 00
*Male Primary No. 3, 124 and 126 North High street	600 00
*Male and Female Primary No. 12, 611 Barre street	300 00
*Male and Female Primary No. 32, 401 Lafayette avenue	360 00
Male and Female Primary No. 36, 2223 East Baltimore street	900 00
Male Colored Primary No. 1, 413 Courtland street	775 00
*Male Colored Primary No. 4, S. E. Corner Tessier and Orchard streets	480 00
*Male Colored Primary No. 8, 801 North Bond street	420 00
*Male Colored Primary No. 8, 824 North Bond street	300 00
Colored Grammar No. 4, S. W. Corner Stricker and Mulberry streets	360 00
*Colored Grammar and Primary No. 10, 1712-1714 Greenmount avenue	360 00
*Male Colored Primary No. 9, Gold and Calhoun streets	360 00
Annex No. 1, 250 Gorsuch avenue, Homestead	144 00
*Annex No. 2, Gilmore lane, near York road	480 00
Annex No. 5, Hickory avenue, near Fourth avenue	600 00
Annex No. 14, Park Heights avenue	360 00
Annex No. 20, North avenue and Payson street	240 00
*Annex No. 20, South side of Walbrook avenue, east of Payson street	300 00
Annex No. 21, Garrison avenue and New Liberty road, North Walbrook	360 00
*Annex Colored No. 1, Barclay street, near Merryman's lane	120 00
Annex Colored No. 2, Edmondson and Garrison avenues	300 00
Total amount of rents	$15,013 92

*Branch of.

SCHEDULE

— OF —

SALARIES OF OFFICERS AND TEACHERS OF PUBLIC SCHOOLS.

GENERAL EXPENSE ROLL.

Superintendent of Public Instruction	$2,500
Assistant Superintendent	2,000
Secretary	2,000
Assistant Secretary	1,500
Superintendent of Supplies	1,800
Librarian	1,200
Clerk to Secretary	1,000
Clerk to Superintendent and Secretary	1,000
Superintendents of Music, each	1,500
Librarian of Public School Library	900
Supervisor of Drawing	720
Teachers of Drawing, each	500
Directress of Sewing	600
Teachers of Sewing, each	500
Janitor of Warehouse	520

BALTIMORE CITY COLLEGE.

President	$2,400
Vice-President	2,200
Professors (not otherwise specified)	2,000
Professor of Writing and Book-keeping and Secretary to Faculty	2,000
Professor of Drawing	1,800
Adjunct Professors	1,800
Tutors	1,000

FEMALE HIGH SCHOOLS.

Principals	$2,400
First Assistants	1,008
Other Assistants and Teachers, each	900

BALTIMORE POLYTECHNIC INSTITUTE.

The present President of this school is an officer of the United States Navy, detailed for service at this school, and receives from this Board	$1,500
Vice-President	1,200
Instructors	1,200
Assistants	$600, $720, $900, 1,000

COLORED MANUAL TRAINING SCHOOL.

Principal	$1,200
Instructors	900
Assistants	600

MALE GRAMMAR SCHOOLS.

	1st Year.	2d Year.	3d Year.
Principals	$1.296	$1,404	$1,500
First Assistants (male)	804	900	.....
First Assistants (female)	588	672	.....
Second Assistants	456	516	.....
Third Assistants	444	504	.....

ENGLISH-GERMAN SCHOOL.

	1st Year.	2d Year.	3d Year.
Principals	$1,296	$1,404	$1,500
Vice-Principals	804	900	1,008
First Assistants (English female)	564	648	.....
First Assistants (German male)	600	.....	.....
Teachers in charge of lowest grade	444	468	504

Other assistants in grammar grades, same as third assisants in male grammar schools.

Assistants in primary grades, same as assistants in primary schools.

FEMALE GRAMMAR SCHOOLS.

	1st Year.	2d Year.
Principals	$804	$900
First Assistants	564	648
Second Assistants	444	504
Third Assistants	432	480

MALE AND FEMALE PRIMARY SCHOOLS.

	1st Year.	2d Year.	3d. Year.
Principals	$600	$696	....
Assistants	408	432	$468
Teacher in charge of lowest grade	444	468	504

COLORED HIGH SCHOOLS.

The same as female high schools.

COLORED GRAMMAR SCHOOLS.

Principals and assistants the same as male grammar school.

COLORED PRIMARY SCHOOLS.

	1st Year.	2d Year.	3d Year.
Principals (male)	$804	$900	....
Principals (female)	600	696	....
First Assistants (male)	700	....	....
Assistants (female)	408	432	$468
Teacher in charge of lowest grade	444	468	504

INTERMEDIATE SCHOOLS.

	1st Year.	2d Year.	3d Year.
Principals (males)	$1,200	....	....
Principals (females)	804	....	....
First Assistants	600	....	....
Teacher in charge of lowest grade	444	$468	$504

Other assistants in grammar grades, same as third assistants in female grammar schools.

Assistants in primary grades, same as assistants in primary schools.

UNCLASSIFIED SCHOOLS.

Composed of Primary and Grammar Scholars and Not Otherwise Designated.

	1st Year.	2d Year.	3d Year.
Principals	$696	$780	$900
First Assistants	504	552	600

SATURDAY NORMAL CLASS.

Principal	$200
Assistants	150

NIGHT SCHOOLS.

Principals, $2.50 per night for actual service.
Assistants, $1.50 per night for actual service.

THE SCHEDULE OF SALARIES TO BE SUBJECT TO THE FOLLOWING CONDITIONS:

All below the grade of second assistant in male and female grammar schools to be graded as third assistants.

In male and female grammar schools not employing three assistants, the lowest assistant shall rank as third assistant, and so continue until there are three assistants employed in that school, excepting the first assistant, who shall in all cases rank as first assistant.

Teachers who may have served for *two full* years in any of the public schools of Baltimore, upon promotion to grammar schools shall be entitled to the second year's salary of that grade to which they may be assigned (excepting that of principal), and teachers who shall have served *three full* years, counting the time served in the public schools of Baltimore, and the time served in any school or schools of recognized merit, shall be entitled to the highest salary of the grade to which they shall be assigned (ex-

cepting the grade of principal of grammar school), from and after the date upon which they submit satisfactory written evidence of that fact to the President of the Board, who shall be vested with power to decide.

Teachers elected during the month of September shall receive the full salary for the months of July and August of the succeeding year, those elected in October shall receive nine-tenths of said salary; in November, eight-tenths, and so on to the close of the scholastic term.

Any teacher who shall have served the usual probationary period of one year before the close of the scholastic year, and who shall have been elected as a regular teacher, shall receive her proper proportion of salary for July and August.

When transfers are made from one school or position to another, the teacher transferred shall draw the salary of the position from which he or she has been transferred till the end of the month in which the transfer shall be made.

SALARIES OF JANITORS, JANITRESSES AND FIREMEN, Etc.

Janitor of Baltimore City College	$1,000
Assistant janitor of Baltimore City College	600
Fireman of Baltimore City College	600
Janitor of Baltimore Polytechnic Institute	720
Fireman of Baltimore Polytechnic Institute	720
Janitor of Baltimore Polytechnic Institute, New Building	720
Night watchman of Baltimore Polytechnic Institute	480
Fireman of Eastern Female High School	480
Fireman of Western Female High School	720
Janitresses of Eastern Female High School	$240, 300
Janitresses of Western Female High School	$240 360
Janitor of Colored Polytechnic Institute	480

For large furnaces in schools having the Smead system, each $10 per month; other systems as specially fixed by the Board, and for hot-air furnaces $5 each per month.

Janitresses of schools having 3 class-rooms shall receive $9 per month; 4 class-rooms, $10 per month; 5 class-rooms, $11 per month; 6 class rooms, $12 per month, and increase $1 per month for each additional class-room in the main building. They shall receive additional compensation for making fires in stoves from October to April, inclusive, at the rate of 75 cents per month for each stove on the first floor and $1 for each stove on the second floor, and $1.25 for each stove on the third floor. The salaries of janitresses of schools containing more than 12 class-rooms, and of janitresses of buildings used as branches of schools, shall be fixed by the President and Secretary, subject to the approval of the Board.

Janitresses of night schools, $4 per month: firemen of night schools, $5 per month.

REPORT

OF THE

Superintendent of Public Instruction.

BALTIMORE, January 1, 1899.

To the Honorable the Mayor and City Council and Board of School Commissioners of Baltimore City:

GENTLEMEN: The following report of the condition and statistics of the schools for the year ended December 31, 1898, is submitted for your consideration.

SUMMARY OF STATISTICS.

Population of Baltimore—White, 384,394; Colored, 71,033; United States census, 1890		455,427
Estimated population		600,000
Basis of taxation		$362,530,309
School tax—City, 45¾ cents; State, 12½ cents		58¼ cents
No. of pupils on roll December 31, 1898		65,170
Increase during the year	568	
Number of pupils in school during the year		79,684
Increase	1,142	
Number of teachers December 31, 1898, exclusive of special teachers		1,764
Increase	19	
Number of schools December 31, 1898		183
Increase	6	
Percentage of attendance on enrollment (Same as last year).		85

HIGH SCHOOLS AND CITY COLLEGE.

Number of pupils on roll December 31, 1898		1789
Increase	26	
Percentage of attendance (Same as last year).		93
Number of pupils to a teacher on enrollment (Same as last year).		38
Number of pupils to a teacher on average attendance (Same as last year).		35

POLYTECHNIC INSTITUTE.

Number of pupils on roll December 31, 1898		508
Decrease	46	
Percentage of attendance		94
Decrease	1 per cent.	
Number of pupils to a teacher on enrollment		24
Decrease	1	
Number of pupils to a teacher on average attendance (Same as last year).		23

GRAMMAR SCHOOLS.

Number of pupils on roll December 31, 1898		15,162
Increase	16	
Percentage of attendance (Same as last year).		88
Number of pupils to a teacher on enrollment		35
Decrease	1	
Number of pupils to a teacher on average attendance (Same as last year).		31

ENGLISH-GERMAN SCHOOLS.

Number of pupils on roll December 31, 1898		7,151
Increase	8	
Percentage of attendance		89
Decrease	1 per cent.	
Number of pupils to a teacher on enrollment (Same as last year).		38
Number of pupils to a teacher on average attendance		34
Increase	1	

PRIMARY SCHOOLS.

Number of pupils on roll December 31, 1898		21,889
Decrease	200	
Percentage of attendance		83
Decrease	1	
Number of pupils to a teacher on enrollment (Same as last year).		36
Number of pupils to a teacher on average attendance		29
Decrease	1	

COLORED SCHOOLS.

Number of pupils on roll December 31, 1898		9,152
Increase	399	
Percentage of attendance		79
Decrease	1	
Number of pupils to a teacher on enrollment (Same as last year).		37
Number of pupils to a teacher on average attendance		29
Decrease	1	

ANNEX SCHOOLS.

Number of pupils on roll December 31, 1898		9,260
Increase	387	
Percentage of attendance		83
(Same as last year).		
Number of pupils to a teacher on enrollment		37
Decrease	7	
Number of pupils to a teacher on average attendance		31
Decrease	4	

COLORED HIGH SCHOOL.

Number of pupils on roll December 31, 1898		167
Increase	6	
Percentage of attendance		94
Increase	1 per cent.	
Number of pupils to a teacher on enrollment		23
Decrease	1	
Number of pupils to a teacher on average attendance		21
Decrease	1	

COLORED POLYTECHNIC INSTITUTE.

Number of pupils on roll December 31, 1898		92
Decrease	28	
Percentage of attendance		86
Decrease	4 per cent.	
Number of pupils to a teacher on enrollment		14
Decrease	3	
Number of pupils to a teacher on average attendance		12
(Same as last year).		

Table showing the increase or decrease in the number of pupils in the grades of the Primary and Grammar Schools and in the different "years" of the High Schools, College and Polytechnic Institutes:

	Males.	Females.	Totals, '98.	Totals, '97.	Increase.	Decrease.	
13th year. Fifth year, B.C.C	43	.....	43	34	9	....	
12th year. Fourth year, B. C. C. and High Schools..	60	147	207	238	....	31	
11th year. Third year, B. C. C., High Schools and Polytechnic Institute....	160	185	345	317	28	...	
10th year. Second year, B. C. C., High Schools and Polytechnic Institute....	197	338	535	592	....	57	
9th year. First year, B.C.C., High Schools and Polytechnic Institute.....	429	581	1,010	888	122	....	
Number in Higher Sch'ls.	889	1,251	2,140	2,069	159	88	+ 71
8th year. Eighth Grammar Grade	*782	856	1,638	1,768	....	130	
7th year. Seventh Grammar Grade	†1,297	1,376	2,673	2,651	22	....	
6th year. Sixth Grammar Grade	‡2,119	2,282	4,401	4,243	158	....	
5th year. Fifth Grammar Grade	3,051	3,223	6,274	6,200	74	....	
4th year. Fourth Grammar Grade	4,197	4,319	8,516	8,272	244	....	
Number in Gram. Schools	11,446	12,056	23,502	23,134	498	130	+368
3d year. Third Primary Grade	4,777	4,768	9,545	9,434	111	....	
2d year. Second Primary Grade	5,746	5,615	11,361	11,592	....	231	
1st year. First Primary Grade	9,346	9,276	18,622	18,373	249	....	
Number in Prim. Schools.	19,869	19,659	39,528	39,399	360	231	+129
Number in Higher Schools, $3\frac{3}{10}$ per cent.....	889	1,251	2,140	2,069	71	....	
Number in Grammar Schools, 36 per cent.....	11,446	12,056	23,502	23,134	368	....	
Number in Primary Schools, $60\frac{7}{10}$ per cent.....	19,869	19,659	39,528	39,399	129	....	
Totals	32,204	32,966	65,170	64,602	568	....	+568

*Includes 119 pupils in Preparatory Dep't of Polytechnic Institute.
†Includes 161 pupils in Preparatory Dep't of Polytechnic Institute.
‡Includes 136 pupils in Preparatory Dep't of Polytechnic Institute.

SUMMARY STATEMENT SHOWING THE NUMBER OF PRIMARY AND GRAMMAR SCHOOL PUPILS PROMOTED DURING THE YEAR 1898.

GRADE.	Number on roll June, 1898.	Number promoted by recommendation, June, 1898.	Number promoted by examination, June, 1898.	Entire number promotions, June, 1898.	Promotions at other times during the year.	Entire number promoted during the year.	Percentage of promotions.
Eighth	1,423	1,142	3	1,145	12	1,157	.813
Seventh	2,069	1,498	9	1,507	25	1,532	.740
Sixth	3,379	2,366	11	2,377	52	2,429	.719
Fifth	5,298	3,792	22	3,814	53	3,867	.729
Fourth	7,146	5,130	23	5,153	82	5,235	.732
Third	8,614	6,606	23	6,629	60	6,689	.776
Second	10,676	7,585	11	7,596	87	7,683	.719
First	16,552	8,354	72	8,426	81	8,507	.513
Total	55,157	36,473	174	36,647	452	37,099	.672

ACCOMMODATIONS.

NORTHWESTERN SECTION.

Annex School No. 8.—The main building has not a sufficient number of class-rooms to properly accommodate the pupils. The Branch, occupied by a portion of the school located a short distance from the main building, was at one time considered unfit for use and abandoned.

This section is increasing in population and steps should be taken to provide the neccessary accommodations for the pupils now attending and for the increase in numbers which may be expected.

Annex No. 20.—The pupils are housed in two unsuitable rented buildings and it is necessary to provide suitable accommodations for this school.

Colored School No. 9.—The new building occupied by this school is overcrowded, two teachers with their classes having, in several instances, to occupy class-rooms large enough for only one class.

English-German Schoool No. 5 occupies two buildings, situated at some distance from each other, and it is desirable that the entire school should be housed in one building in order to enable the principal more conveniently and effectively to overlook the work of his teachers and their classes.

Colored School No. 4 is greatly in need of increased and more suitable accommodations. This has been the case for a long time and the school has suffered on this account. In case of fire it would be very difficult to clear the building quickly on account of the arrangement of the rooms and the insufficient means of egress. It was the intention to use the building now occupied by English-German School No. 1, for one of

the departments of this school when the completion of the building for the City College enabled No. 1 English-German School to occupy the building now occupied by the College.

The discipline and instruction of the students at the College are seriously impaired on account of the inadequate and unsuitable accommodations afforded by the building, temporarily occupied while the building for the College is being erected. The delay in providing this building for the use of the College, not only most injuriously affects that institution, but it also seriously retards the progress of the pupils attending English-German School No. 1 and Colored School No. 4

Colored School No. 7 is greatly overcrowded. Two teachers with their classes occupy many of the rooms only large enough for one class, while small rooms intended for the use of teachers have to be used as class-rooms. Such conditions are not only very unsanitary but they prevent the accomplishment of good work.

Grammar School No. 6.—On account of the insufficient number of rooms some of the classes of the female department have to be taught in the dwelling house, owned by the city, located on the Crook lot. The rooms in this building are entirely unsuitable for class-rooms. They are too small, inconveniently arranged, and so badly lighted as to necessitate the use of gas. For the purposes of supervision by the principal, it is very important that the classes should be taught together in one building. If the main building is sufficiently strong, it would be well to add a third story to supply the necessary number of class-rooms.

Annex School No. 7 needs another class-room. One of the rooms is occupied by two teachers and their classes. Both on account of health and instruction this should be remedied.

Annex Schools No. 4 and No. 6, occupying the same building, need increased accommodations. Many of the rooms, only large enough for one class are occupied by two teachers and their classes. Under such unfavorable conditions the teachers cannot do their work successfully. It is necessary to build a house in the vicinage for the use of these schools. The overcrowded condition of the building occupied by these schools could be considerably decreased if some of the primary pupils were sent to No. 5 and No. 17 Annex, a short distance away, where there is room for their accommodation.

The rented building occupied by Annex School No. 5 is by no means an up-to-date building. The arrangement and sanitation of the rooms are very defective. The two small rooms on the second floor in the east end of the building, formerly constituting one class-room, are not suitable for classes of the average size.

Annex School No. 14 occupies a rented house entirely unsuitable for school porposes. The rooms are too small and they are badly arranged and ventilated.

NORTHEASTERN SECTION.

The building occupied by the Eastern Female High School needs several additional class-rooms and other important facilities for carrying on the work of the school successfully. The high schools play a most important part in our educational system, as they not only give the students who attend them an education

which a woman finds necessary in any walk of life, but they also give most of those who are to serve as teachers in the schools their academic training; hence it is neccessary in the highest degree for both of these reasons and for others which might be mentioned to supply the high schools with everything necessary for their thorough efficiency.

English-German School No. 3 occupies three buildings, two of which, built for dwellings, are entirely unsuitable for school purposes. The rooms in one of these houses especially are too small; they are badly lighted and arranged, and they have no adequate means of ventilation or of egress.

English-German School No. 7 occupies two rented dwelling houses, the rooms of which are not suitable for class-rooms on account of their arrangement, small size and lack of sufficient light and ventilation.

No. 26 Primary School.—The building occupied by this school is not in good sanitary condition. The lower floor is insufficiently lighted, and the surroundings are very unsatisfactory.

Primary School No. 27.—The damp and badly-lighted rooms in the basement of the building, occupied by this school, are very unsuitable, and they should not be used for school purposes. When the building occupied by No. 13 Primary School, a short distance from this locality, was built, it was naturally expected that the overcrowded condition of No. 27 would be relieved and that the rooms in the basement would be abandoned, as many of the children lived near enough to No. 13 to attend that school; but there are at this time unoccupied rooms at No. 13 and others only partially filled, and the use of the basement of No. 27 is continued.

Grammar School No. 11 is badly in need of increased accommodations. Teachers' reception rooms have to be used as class-rooms, and one class of the female department is taught in the building occupied by No. 13 Primary School. It is needless to say that such unfavorable conditions seriously impair the efficiency of the school.

Male Colored School No. 8 is housed in three buildings, two of which, built for dwellings, are totally unfit for the use of the school. The principal cannot give his school efficient oversight when it is separated in this way, and the teachers and scholars cannot do good work in the small, badly-lighted and ventilated class-rooms in which they are accommodated.

No. 20 Grammar School.—On account of the insufficiency of room in the main building it is necessary to use two rented houses in the neighborhood to accommodate some of the classes of both the male and female department of this school. The main building should be enlarged so that all the pupils could be accommodated in suitable class-rooms under one roof.

No. 3 Primary School.—The main building is not large enough to provide seats for all the pupils belonging to the school, and several classes have to be taught in unsuitable rented dwellings near the main building. The rooms in these buildings, though they are the best that could be secured, are unfit for class-rooms on account of their bad arrangement, size, and lack of sufficient light and ventilation. In case it became necessary to move the pupils out of the building quickly on account of fire or for other reasons, there would be danger of loss of life, as the means of egress are very inadequate.

Grammar and Primary School No. 9.—Both the male and female departments of this school are kept in rented houses, built for dwellings, which do not provide sufficiently large class-rooms. The rooms are also badly lighted and ventilated. They are also badly arranged, and if it became necessary to clear the buildings quickly on account of fire or for other reasons it would be difficult to do so on account of the insufficiency of the means of egress. The location of the female department is very objectionable on account of the character of the neighborhood.

Colored High School.—The building occupied by this school is not in good sanitary condition, and it does not afford the requisite facilities for the instruction of the pupils. Gas has to be used almost continually in all the rooms on account of the insufficiency of light.

Male Colored School No. 1.—The rented dwelling occupied by this school does not afford the necessary facilities for carrying on the work of the school successfully. The class-rooms are too small, they are badly arranged, lighted and ventilated, and the means of egress are insufficient.

No. 32 Primary School needs additional class-rooms. Some of the classes are taught in rented rooms, which do not afford suitable accommodations.

Colored Grammar School No. 10.—During the year the building occupied by this school has been greatly overcrowded. In several instances it has been necessary for two teachers to instruct their classes in a room only large enough to accommodate one class. Small, unsuitable rented rooms, in the neighborhood have also to be used to accommodate two of the classes.

Annex School No. 1.—The main building not being large enough, small, badly arranged, lighted and ventilated rooms in a small dwelling near the school have to be used for the accommodation of some of the classes. This section is increasing in population and it is necessary to enlarge the building sufficiently to properly accommodate the children belonging to the school under one roof and also to provide for increase in the future.

Annex School No. 2 is very much in need of increased accommodations. Unsuitable rooms in a rented dwelling, at some distance from the main building, have to be used by some of the classes. If the main building were enlarged so as to provide rooms for all the classes under one roof, the teachers whose classes are now in the rented building could accomplish better work, and the principal would be able to supervise his school more conveniently and effectively.

Annex Colored School No. 1 occupies two small buildings a short distance apart, neither of which is suitable for the use of the school, and it is necessary to supply this school with better facilities.

SOUTHWESTERN SECTION.

Grammar School No. 8.—The building is not large enough to accommodate all the classes of the school, and some of the classes of the male department have to be taught in rented rooms in the neighborhood.

English-German School No. 6 occupies two buildings about half a mile from each other. The main building needs enlargement. In the separated condition of the school the principal cannot conveniently supervise the work of his teachers.

Primary School No. 10.—The building occupied by this school is not in good sanitary condition, and it should be put in proper condition or another building should be provided for the use of the school.

Primary School No. 22.—The building occupied by this school is in every respect totally unfit for school purposes. It is unsanitary, badly arranged, with no adequate means of ventilation. It is located near the Mount Clare shops, and the noise is so great as to seriously interfere with the work of the school. If our teachers are to train properly the rising generation we must give them much better facilities for performing their work than the teachers of No. 22 Primary are provided with. In the interests of humanity and of the city, the class of children attending this school should be provided with a suitable building and with whatever else is necessary to train them to be successful in life and to be good citizens.

Primary School No. 12.—The building occupied by this school being too small to seat all the classes, several of them have to be taught in class-rooms in small rented dwellings near the school. These rooms are too small; they are dark and badly ventilated, and it is necessary to provide suitable accommodations for the pupils occupying them. The main building is by no means an up-to-date house. The class-rooms are too small and those on the first floor are not in good sanitary condition. Unless the building can be enlarged sufficiently and these defects eliminated a suitable house large enough to accommodate the entire school should be erected in the locality.

Colored School No. 6.—The building is amply large enough for the school, but the arrangment of the

rooms and their unsanitary condition, especially those located on the lower floor, rendered it necessary to make needed improvements.

Colored Grammar School No. 3 is housed in an old, badly constructed and ventilated building, which is located in a very noisy neighborhood, and it is necessary to provide the school with suitable accommodations.

Grammar School No. 10.—Both departments require additional class-rooms. Some of the classes are taught in small rented dwelling-houses in the neighborhood, which are entirely unfit for the purpose. It is recommended that the house occupied by this school be used by No. 17 Primary School, whose building is unfit for use and should be abandoned, and that a new building large enough to accommodate Grammar School No. 10 and the increase which may be expected in the future, be built south east of its present location. This part of the city has been built up to the south and east very considerably within the last few years, and as the erection of dwellings on the land yet unoccupied will continue, by carrying out the plan recommended this locality would be adequately supplied with grammar school facilties for some time to come. In the meantime, the classes now being taught in the rented dwellings, should be accommodated in some of the unused class-rooms in the buildings occupied by the following primary schools: No. 29, No. 35, No. 4. This arrangement would provide the classes with better accommodation without expense to the city and enable us to give up the rented buildings.

Grammar School No. 4.—Rented rooms are used by some of the classes of the male department. The

unoccupied furnished rooms in the building occupied by No. 29 Primary School should be used for the accommodation of these classes.

Grammar School No. 16.—The building occupied by this school needs enlargement. One of the classes of the female department has to be taught in a small room built for the use of the teachers.

Primary School No. 33 is so greatly overcrowded that the conditions are unfavorable for health and instruction.

English-German School No. 2.—The building is not large enough; in several instances two classes have to be instructed in rooms large enough for only one class. The yard of the school is very small and it is desirable to purchase and add to it the small vacant lot north of the building. In case a dwelling-house were built on this lot the light of the school building would be very seriously affected.

Primary School No. 28.—The class-rooms in this building are too small; they are also badly arranged, and those on the first floor are not well-lighted and ventilated.

SOUTHEASTERN SECTION.

Grammar School No. 2.—The building needs enlargement. Several classes of both departments have to be taught in rented rooms. A third story would supply the additional class-rooms needed.

Primary School No. 23.—The building occupied by this school is not in good sanitary condition, and it is very desirable that steps should be taken to make the necessary improvements.

No. 36 Primary School is kept in a rented building

entirely unsuitable for school purposes, and it is necessary to erect a suitable building for the use of this school.

EVENING SCHOOLS.

There are many boys residing in the city to whom the doors of the public day schools are practically closed, as they are employed during the day, and can attend school at no other time than at night. Many of them are compelled during the day to assist in supporting widowed mothers or other members of the family who are unable to work. Some of them, forced by circumstances to earn their living, grow up upon the streets, and will eventually fill our prisons or reformatories unless they can be trained in good habits by the upbuilding influences of good schools. The school system of a large city is incomplete and cannot do all the good work it should accomplish unless it maintains well-organized and properly-equipped evening schools. Whenever such schools have been established under proper regulations and efficient management, they have been valuable to the community, and the good they accomplished demonstrated the wisdom of those who secured their establishment. Such schools to the extent they may be required should be organized under proper regulations in connection with the school system of Baltimore, in order that those of school age, who are employed during the day, may be supplied with the necessary means of improving their leisure hours during the evening. Our evening schools have undoubtedly accomplished much good, but in order to be more effective important changes should be

made in their organization and management. Instead of having so many evening schools, five might be found to be sufficient—one located in the central portion of the city and one in each of the four sections. They should be kept open during a stated portion of the year, from six to eight months, and they should be supplied with well-qualified teachers. The centrally located school should be a grammar and a high school, so that anything necessary in the way of instruction might be supplied. If all were rigidly excluded except those who really desire to improve themselves, such large numbers would not be found in the schools. As the number of teachers in an evening school is determined by the number of pupils in attendance, some of the principals, for the purpose of keeping their teachers employed, permit the attendance of many unruly and troublesome boys, who not only receive no benefit from the schools themselves, but who seriously interfere with the instruction of those worthy members who attend for the purpose of improvement. In order to exclude the class who flock to the evening schools simply for amusement and mischief rather than for improvement, and who greatly interfere with the management and retard the success of the schools, it would be well to require those entering to make a deposit of a dollar as a guaranty that they will conduct themselves properly, be regular in attendance and endeavor to improve themselves. It being understood that on leaving school this sum would be returned to those who had made reasonable effort to comply with their agreement. This plan has been tried in other places, and it has been found to operate most beneficially.

KINDERGARTEN.

Many children are compelled to leave school by the time they are old enough to earn wages to help support the family; consequently many of them must receive all their schooling in the lowest grades of the schools before they are ten years of age.

In order to afford this class of children, found generally in the slums and in the most forlorn parts of the city, better opportunities for improvement, it is very desirable to organize schools in such sections for the instruction of children between three and six years of age. Kindergartens would lengthen the school life of such children about three years, and rescue them, for a time at least, during the most impressionable period of their lives from the evil influences of homes in which idleness, vice and crime are the daily examples set for their imitation. If the young children of idle, vicious and thriftless parents could be taken from their homes and subjected daily to the humanizing and enlightening influences of good schools, in charge of properly-qualified teachers especially adapted to the performance of such work, many of them would doubtless be rescued from leading such lives as they see daily those around them living, and instead of growing up in ignorance and vice to increase the number of the idle and lawless, they would become industrious, law-abiding citizens. Such schools must constitute an important feature of any successful scheme the city may eventually be compelled to adopt, in its own protection, for the purpose of eradicating the most vicious and lawless portions of its population from the worst sections of the city.

A writer upon this subject summarizes his views as follows:

(a). That the three years preceding the school age are, for educational purposes, the most valuable years of the child's life.

(b). That under our present system of public and private education these years are, relatively speaking, wasted.

(c). That this waste is just as general among the rich as among the poor, and is little less ruinous to the former than to the latter.

(d). That it may be largely saved by the introduction of some such institution as the kindergarten.

(e). That such general instruction is only possible in the form of free kindergartens, established in connection with the public schools, in sufficient numbers to accommodate all the children sent to them.

(f). That the necessary outlay for such kindergartens would be amply repaid to society by the increased productiveness of the generation educated within them.

(g). That owing to the economic conditions of our society, which prevents the majority of our children from going to school beyond the tenth year, the only means of securing the minimum of education absolutely necessary to the welfare of our society lies in utilizing for educational purposes the three years preceding the school age, and the only institution which promises to do this is the kindergarten.

EDUCATION IN BALTIMORE.

The establishment of the Johns Hopkins University and the Woman's College has given decided impetus to the lower educational institutions, both public and

private, in the City of Baltimore. Persons are attracted to the city as a place of residence on account of its good government, healthy climate, unsurpassed markets, business opportunities, public libraries, etc., and especially on account of the facilities it offers for the education of their children. At scarcely any expense they have the advantages for education from the primary school through the university. There is no charge in any department of the public schools for tuition, books or stationery, and although the university is not a public institution, yet the conditions and terms of admission are such that almost without charge students may avail themselves of its numerous and unsurpassed advantages. It is very important in arranging the work of the public schools to place them, without impairing their practical character, in harmonious relations with the higher educational institutions of the city, so that students may advance, uninterruptedly, from the lowest grade of the public schools through the college and university. Such an arrangement would not lessen the usefulness of the schools to those who do not intend to extend their education through college. The best educators maintain that the training which best fits one to enter college should be the best for all other purposes. The beneficial influence of the university and the Woman's College upon the schools has been unmistakably felt, and this will be more and more the case as the relations of the schools with these institutions become gradually more perfected. The authorities of the University have manifested great interest in the schools, and have responded liberally and cheerfully to all the calls

we have made upon them. In this connection the following statement is pertinent: The female high schools educate most of our teachers, and upon comparing their course of study with that of the City College, it is at once apparent that the young ladies in the high schools do not have educational advantages equivalent to those furnished the young men who attend the City College. In addition to what is taught in the high schools, students attending the college have instruction in Greek, in French, in higher mathematics, greater facilities for instruction and experimenting in physics and chemistry, and about twice as much instruction in Latin. Up to the time the boys and girls enter these schools they pursue the same course of study, but strange to say, when they leave the grammar schools the boys pursue a much more extensive course in the college than the girls do in the high schools.

There is no reason for the existence of such a great difference between the two courses of study. In view of the fact that many of the graduates of the high schools become teachers in our schools, it is in the best interests of the schools, not to mention other good reasons, to give the young women attending our schools all the facilities necessary for their improvement. The high schools would turn out much stronger teachers, both as to training and information, if their course of study were made as comprehensive as that of the college. By making some of the studies elective, all of those mentioned might be advantageously introduced without increasing the demands upon the efforts of the students, or without greatly increasing the cost of instruction in the high

schools. Recommended graduates of the college are admitted to the collegiate department of the Johns Hopkins University without examination, and some of the students, after attending the college for three years, pass the matriculatory examination at the Hopkins, while graduates of the high schools have to be conditioned when admitted to the Woman's College. This difference is not due to a lack of thoroughness on the part of the high school graduates in the course of study they pursue, but to the fact that the course of study does not require some of the subjects to be taught to the extent that is required for admission to college. I am quite sure that every one interested in the welfare of the public schools will agree that this matter should receive careful consideration.

SUPERVISION AND PRINCIPALS.

The reports of the principals give encouraging evidence that better results are being secured by means of the supervision principals are enabled to give their schools by allowing them an assistant to teach their classes while they are thus engaged. Among others this is one of the means which have brought about decided improvement in the schools during the last few years.

To supervise a school efficiently requires untiring industry, excellent judgment, skill in teaching and in estimating results, kindness and firmness towards subordinates, and above all, the ability to overlook the whole school, so as to know its defects as well as its good points and to be able to devise and have carried out plans for improvement. Some of the principals know their schools well, and they are suc-

cessfully inaugurating and having carried out plans for improvement, while others, though they may be good teachers themselves, fail to exercise a sufficiently potent influence to bring about needed reforms in methods and management throughout their schools. As the teacher so is the school, is an old maxim which everyone acknowledges to be true, and it is none the less true that as the principal so are the teachers and the school. The invigorating influence of an educated, industrious, gentlemanly principal, skillful—practically and theoretically—in school affairs, who has his work at heart and recognizes its importance to the individual pupil and to the State, can but make any school over which he presides more and more powerful in preparing the young for the duties of life and for good citizenship. His efforts must lie in the main in training his assistants to do their work so as to secure the best educational results While no one is capable of making a person who has neither the necessary academic training nor any aptitude for school work a good teacher, yet, when a probationary teacher of average capacity is placed in a school, which is under the management of an efficient principal, the intelligent oversight and guidance of the principal will result, in most cases, in helping her to become successful. The weak teachers of his school, under his guidance and instruction, are assisted in learning how to do their work in proper relation to the work of the other grades and by means of correct methods of teaching. My observation of the methods used in teaching the various subjects pursued in the schools convinces me that our teachers are daily learning how to teach by more rational methods and to secure better results. In arithmetic, for instance,

instead of learning the rules and then how to work the examples mechanically by following them, the subject is begun with oral exercises, conducted so as to develop the facts of the subject, and after this has been accomplished rules are made by the pupils themselves and the examples solved. Of course in memorizing rules it is best for the pupils to learn those given in the book. The method of learning by observation and judgment on the part of the pupil is followed by our best teachers, when possible, in teaching nearly all the subjects of the course. In language work, including reading, spelling, grammar, the recitation of selections and declamation, composition—oral and written—and literature, stress is laid upon habituating pupils to use correct language, both in writing and speaking, and to acquire a taste for good literature. In observing the teachers while they are instructing their classes, and in examining the pupils to test what knowledge and intellectual power they have acquired, I find in the large majority of cases that better results are being secured by the use of better methods of instruction. One most beneficial result that is being secured in many of the classes through the influence of efficient supervision is the use and not the abuse of the text-book on the part of the teacher. Teachers, in the main, come to their classes with the lessons for the day faithfully prepared, so as to be able to teach them almost entirely without having to refer to the text-book. Huxley says: "Elementary teaching involves that difficult process of knowing what you know so well that you can talk about it as you talk about your ordinary business. A man can always talk about his own business. He can always make it

plain, but if his knowledge is hearsay, he is afraid to go beyond what he has recollected and put it before those that are ignorant in such a shape that they shall comprehend it. That is why, to be a good elementary teacher, to teach the elements of any subject, requires most careful consideration if you are master of the subject, and if you are not a master of it, it is needful you should familiarize yourself with so much as you are called upon to teach—soak yourself in it, so to speak—until you know it as part of your daily life and daily knowledge, and then you will be able to teach anybody." Occasionally an old-fashioned teacher, with great reverence for methods that obtained in the past, may be found "hearing a lesson," book in hand, with all his attention concentrated on the book finding out the answer to a question just given or the question to ask the next pupil, while the class, entirely uninterested in such dry-as-dust work, is inattentive and more or less disorderly. Good supervision is getting the teachers to realize the fact that the teacher who has thoroughly prepared the lessons for the day and who uses correct methods of teaching will create an interest in the subject, secure the attention of the class and not be troubled with disorder. A lack of discipline in a class is generally the result of poor teaching. When methods are used which appeal to the intellect so as to arouse interest and secure attention, school work is not distasteful,—the mind is being trained and useful knowledge is being acquired. Under such circumstances better attendance is secured and, it may be said, all the ends for which schools are established are being attained.

The supply of matter placed upon the list for use as supplementary reading has enabled many of the principals by judiciously selecting and using suitable selections to greatly improve the language and reading of their pupils and also to accomplish something in the way of creating a taste for good literature.

Some of the principals use the money placed at their disposal for the purchase of books and stationary, intelligently and economically, and generally secure from the list whatever is needed for the use of their schools. In the schools presided over by such principals you will find a good supply of well-selected supplementary reading for each grade, and other valuable books, which are used as aids in teaching history, geography and other subjects.

The methods pursued in teaching literature, geography and history are much better than those formerly used in the schools; the additional matter upon these subjects placed upon the list, the grade meetings, the teacher's classes, and intelligent supervision have secured this improvement.

At times a principal is found who does not know what is going on in his classes, but as a general thing principals supervise with good results and work cooperatively with those who are charged with the duty of visiting their schools.

While it must be said the principals vary largely in the degree of efficiency with which they discharge their duties, yet it should also be said that great improvement in this respect is going on, and that apparently all are endeavoring to learn how to supervise successfully.

VACATION SCHOOLS AND PLAYGROUNDS.

Last summer and the two preceding summers the Children's Playground Association of the United Women of Maryland obtained permission from the School Board to use the playgrounds of several of the schools during vacation for the purpose of amusing and instructing the small children in the neighborhood. Many children were enrolled, and play, under the intelligent direction and oversight of the teachers placed in charge of the children, not only kept them out of the streets away from vicious associations, but rendered them very happy and afforded the opportunity of training them in many useful habits of body and mind. These playgrounds, maintained without expense to the Board, have proved quite successful, and it is expected that more of them will be organized next summer.

The Association for the Improvement of the Condition of the Poor organized a vacation school last summer and obtained permission from the Board to use one of the school buildings. The enrollment was one hundred and fifty, boys and girls, ranging in age from five to fifteen. The course of study consisted of kindergarten, nature study, drawing and manual training. The school was very successful, and its friends hope not only to continue this school next summer but to add considerably to the scope and extent of their work. One who visited the school speaks of it in the following manner: The children congregate daily at the vacation school on Ridgely street, and are so absorbed in the various industries carried on in that interesting place that they are utterly oblivious of atmospheric conditions. The classes are conducted more on the principles governing

a workshop then those of a school-room, the children being allowed to move about in orderly fashion and to control their own actions rather than to maintain iron-clad discipline under watchful surveillance. The class-rooms already begin to look like holiday shops, owing to many tasteful articles the children have fashioned. A corner cupboard is quite filled with specimens of wrought-iron work, candelabra, ink-stands, pen-racks, etc.,—the work of the boys,—and both boys and girls have contributed to a large collection of wood-carving. The designs on many of these articles are reduced copies of large blackboard drawings. Picture frames are made and joined together without the use of glue or nails. The girls have been found to be as skillful as the boys in the use of the knife, and they are equally as painstaking and accurate. A small city of pasteboard houses has been built, each child having learned to draw the design of a house, cut it out all in one piece, with windows and doors open to admit air and inhabitants, and to color the house to suit the taste of the small architect. In the sewing-class the younger girls have completed squares for a soldier's quilt, and the older girls are putting them together. In the drawing-class pictures of birds and butterflies are being made with color pencils. The interest taken by the children has never flagged. Many of them work during the winter months, and find this their only opportunity for instruction during the year. It has been found almost impossible to confine the instruction to three hours in the morning, as was intended. The children desired an afternoon session so much that the head-master, Mr. Locke, permits some of them to return in the afternoon and instructs them himself.

PHYSICAL TRAINING.

Physical training was introduced into the schools during the year, and instruction in this branch has been carried on in the grammar school classes during the last six months. In their reports some of the principals state that the results of this instruction have been beneficial in several ways. The break the exercises make in the regular routine work of the school relieves its monotony to some extent, and at the end of the exercises the pupils return to their work refreshed and apply themselves with more vigor; the exercises not only conduce to physical improvement, but they develop a graceful carriage of the body, and habituate pupils to close attention and prompt obedience to directions. Sufficient time has not elapsed to enable us to speak decidedly as to results. The instruction has not yet been extended into the primary and the high schools. The time given daily to physical culture is too short, but when this even has to be taken from the hours heretofore devoted to instruction in the regular school work some of the principals mention that the demands made for instruction in "other branches" takes so much time from the work heretofore done as to seriously interfere with its successful performance.

Professor Shulz, the Director of Physical Culture, has made the following report upon his work:

My report of the condition of physical training in the grammar schools for the six months, from May 1, to December 31, 1898, is herewith submitted.

Physical training was introduced May 1, 1898. Two male directors and eight female assistants were appointed. Pending the grading of the work of the new department we started in the grammar schools,

The schools are divided into eight districts, each district has a special instructor who visits and teaches in every class once per week in the presence of the regular teacher

A new lesson is given every two weeks; at the end of the month all the lessons are reviewed and the regular teacher receives normal training, which prepares her to give the lesson during the absence of the special instructor.

I cannot praise too highly the co-operation which has been so generously extended by the teachers, and the part they have taken to assist in making physical training a success.

The system we have adopted is one best suited to our local conditions based upon the needs and laws of the human body; its aim is to secure good carriage, symmetrical and harmonious development and graded so as to be adapted to the age of the pupils, exercises to lead from the simple to the complex and again to the simple, so as to prepare the pupil to resume the next study. This system may be called the American Eclectic System.

The directors prescribe and grade the work, give normal training to the special instructors, make regular visits to each school and class, give a model lesson, and by constant assistance and inspection help maintain the work.

IMPROVEMENT OF TEACHERS.

As it is acknowledged among educators that good teachers make good schools, it follows logically that the way to improve a school system is to increase the efficiency of its teaching force.

Well-constructed and equipped school-houses, first-class text-books, etc., however necessary and desirable they may be, will not of themselves make good schools. Unless the teachers are efficient under no circumstances can good schools be secured. Regarding this statement as true, it is plain that the efforts of those in charge of the schools should be in the highest degree directed to the work of improving the teachers in the service and in making arrangements for securing the best-trained persons to fill vacancies occurring from time to time in the schools. In regard to the latter class of teachers the operation of the merit-system rules has been most successful in securing the appointment of a class of teachers who will, as they acquire more and more experience, add materially to the efficiency of the teaching force. These rules require that the names of the graduates of the City College and high schools, and those who pass the semi-annual examinations of applicants for certificates to teach, shall be arranged in lists in the order of merit, ascertained by the graduating average of scholarship or the average made at the examination, and that such persons shall be appointed to positions in the schools in the order in which their names stand on these lists. The probationary period of twelve months, during which time the principal and the superintendent, or the assistant superintendent, must make four favorable reports before the probationer may be elected, guards the schools from any one being permanently employed who has not given satisfactory evidence that he possesses the requisite qualifications for teaching. During the year the Board wisely determined also, in conformance with the provisions of the New City Charter, to

regulate the promotion of teachers by means of competitive examinations, an examination being set for each position, and promotions in the different positions being made according to the merit of those who pass. A number of years of successful service is required in each case before a teacher may be examined for promotion. These examinations for promotion test sufficiently the scholastic training of the applicants, but the main stress is based upon their pedagogical character, both theoretical and practical.

In my inspection of the classes in charge of the probationary teachers, appointed under the merit system rules, I find that these appointees, with few exceptions, considering their lack of previous experience in teaching, are doing excellent service in the schools. They constitute the flower of our graduates and of those who are examined, and it is to be expected, and experience will prove, that this class of persons will teach the children so as to secure the best results. The method of appointment outlined in the New Charter will not only secure the most competent persons to teach in the schools, and thereby greatly increase their efficiency, but it will also accomplish another important purpose, as it will stimulate those attending our schools, who desire to become teachers, to put forth their best efforts to qualify themselves as thoroughly as possible while they are students in the high schools or elsewhere.

The grade meetings, held by direction of the Board on the first Friday of each month for the improvement of the teachers, have exercised a most beneficial influence, and this will be more and more the case as they assume a better organization, and as the teachers

and others concerned in their management acquire more experience and skill in conducting them. At these meetings the work of the grade and the methods used in instruction are explained and discussed, with the view of ascertaining the best methods of teaching the different subjects, and the best plans for conducting the work so as to economize time and effort and secure the best results. Many of the teachers deserve commendation for punctual attendance at these meetings, and for the efforts they have made to improve themselves and their co-laborers.

The object of these meetings is:

1. To increase the efficiency of the teachers.

(a). By giving a distinct idea of the *true ends* of education.

(b). By giving some elementary knowledge of the science of teaching.

(c). By illustrating and enforcing the best methods of imparting instruction.

(d). By giving a correct idea of what constitutes a good school.

2. To secure a greater degree of uniformity in our work.

(a). In methods of organization, records, teaching, government.

(b). By promoting acquaintance and interchange of ideas among teachers.

(c). By promoting professional knowledge and spirit.

(d). By securing co-operation of the teacher with the superintendents.

3. To correct prevailing faults.

(a). Waste of time in the movements of pupils; in

conducting recitations; in repeating work done by previous teachers.

(b). Wrong methods arising from defective knowledge and lack of experience.

The amount of good effected, very largely, by means of these meetings, is shown by the improved work done in the schools, in the creation of professional spirit among the teachers and a manifest desire to know more about the theory and practice of teaching.

Newly-appointed teachers receive at such meetings a considerable amount of the instruction they need, which has a most helpful influence upon their daily duties in the class-room. As all the teachers of the same grade come together, those of experience and skill are able to give useful information to teachers of less skill and experience, which it is difficult for them to get in any other way.

Notwithstanding the fact that these meetings, the lecture courses, supervision, etc., are of great service in rendering our corps of teachers more efficient, yet there is great need for a training school for teachers, in which good high-school graduates or others of equal attainments may be fitted thoroughly for their work before they are appointed teachers in the schools. Almost any one, who has not been well trained for teaching, requires several years to learn how to teach efficiently, and during the time he is learning a great deal of injury is done to the schools. It is very desirable and important to avoid this waste of time and injury to the pupils by placing in the schools none but those who have been prepared to instruct and discipline their classes well when they are first appointed.

At small expense there could be organized in the

building occupied by Male Grammar School No. 1, on Greene and Fayette streets, a school in which properly qualified candidates for places as teachers could in a two-year course in the science and practice of education be well fitted for their work. The four schools located in the two buildings at this point could be used as model schools, in which the practical work of teaching might be observed and practised.

The various classes formed by the teachers themselves for their improvement have also been instrumental in improving the teachers, and those who have been zealous enough to use their time and means for such a commendable purpose deserve the commendation of those in charge of the schools.

Mr. Basil Sollers has rendered useful service in connection with the formation of these classes, and in arranging courses of lectures for the teachers, and I desire to take this occasion to thank him for his willing and helpful co-operation in these and other matters about which I have asked his assistance.

The courses of lectures on the History of Education and Physical Geography provided by the Johns Hopkins University for the benefit of the teachers of the public schools have been most helpful to the teaching force. The lectures of Dr. Adams upon the History of Education and the recommended reading of authors upon this subject not only enabled the teachers to acquire a great deal of useful knowledge upon the history of education and some of the most valuable ideas of the great educators that the world has produced, but the papers required to be prepared and the judicious comments upon their form and matter, made these lectures valuable for other important reasons.

Dr. Shattuck's lectures upon Physical Geography came most opportunely, as our teachers at this time are busily employing themselves in learning how to teach geography in the best way, and these lectures have been most helpful. About two hundred and fifty teachers attended each course, and when we consider that they had to pay for the lectures and to use their own time in attending them, I think it may be said that the teachers are ready to avail themselves of opportunities offered them for improvement.

THE INTERIORS OF SCHOOL BUILDINGS.

With the limited means at hand it has not been possible to do very much towards beautifying the interiors of our school-houses. The rooms in some of the old buildings are in such a state as almost to defy any efforts to improve their appearance. But even when it is impossible to add greatly to the appearance of the rooms they should be kept clean and neat, and it may be stated that both the principals and teachers are giving this matter more attention, and improvement in the cleanliness and neatness in most of the buildings is apparent. Many of the rooms also give evidence of commendable efforts on the part of the teachers to make them as beautiful and inviting as their limited means permit.

The movement undertaken by the Art Commission and the Arundell Good Government Club is a most commendable one, and it is to be hoped that in carrying out their plans they will not only be able to beautify the interiors of many of the buildings, but that their labors may be instrumental also in calling

attention to the fact that some of our buildings are so unsuitable that new structures should be built to take their place.

"The problem of the town school to solve is," Miss Catherine Dodd says, "how to surround the child with beautiful things in order to compensate, in some measure, for the loss of the first-hand acquaintance with nature. The school which aims at developing the whole nature of the child must appeal to the sense of beauty. The interior of the building should be beautiful, the coloring harmonious, the pictures good and the flowers carefully tended. No inharmonious details, such as untidy maps hanging on the walls or bad and crude pictures, should be permitted to pervert the child's taste. The school music should be of the best quality and the songs simple. The literature and poetry should be of the best. Above all, regular excursions into the country all through the spring, summer and autumn should be a part of the ordinary instruction in every town school."

Your attention is called to the accompanying report of the Assistant Superintendent for interesting information concerning the primary schools.

Respectfully submitted.

HENRY A. WISE, *Superintendent.*

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE A.

Statement Showing the Number of Male and Female Teachers and the Number of Pupils on Roll December, 1898, the Average Number of Pupils on Roll During the Year, the Average Attendance for the Year, the Percentage of attendance for the Year, and the Number in School During the Year.

Schools.	Teachers.		Number of Pupils.					
	Males.	Females.	On Roll December, 1898.	Average Roll for the Year.	Average Attendance for the Year.	Percentage of Attendance.	Whole Number in School During Year.	In School During the Year Excluding Duplicate Enrollment.
Baltimore City College.	16	.....	664	631	595	94	999	689
East. Fem. High School	1	12	450	421	392	93	637	424
West. Fem. High School	1	16	675	643	582	90	1,009	675
Colored High School...	1	6	167	157	148	94	217	168
	19	34	1,956	1,852	1,717	93	2,862	1,956
Balto. Polytechnic Inst.	20	.....	508	484	457	94	861	660
Col'd Polytechnic Inst.	7	.....	92	99	85	86	137	126
	27	.....	600	583	542	90	998	786
Male Grammar No. 1..	2	6	312	305	275	90	457	359
" " " 2..	2	11	476	442	400	91	668	502
" " " 3..	2	3	172	160	142	89	260	183
" " " 4..	2	8	351	344	308	90	507	388
" " " 5..	2	6	296	277	239	86	421	318
" " " 6..	2	8	335	307	277	90	468	334
" " " 7..	2	10	460	417	381	91	625	445
" " " 8..	2	10	431	423	371	88	643	483
" G. and P. " 9..	1	4	110	118	90	76	191	173
" Grammar " 10..	2	10	454	447	410	92	655	507
" " " 11..	2	8	375	350	326	93	524	387
" " " 12..	2	8	368	350	321	92	555	388
" " " 13..	1	4	178	171	153	90	261	193
" " " 15..	2	10	438	443	399	90	624	491
" " " 16..	1	10	387	362	307	85	510	498
" " " 17..	2	8	360	346	315	91	491	373
" " " 18..	2	7	336	309	284	92	457	347
" " " 19..	1	10	375	364	329	90	522	422
" " " 20..	2	14	615	587	517	88	861	641
" " " 21..	2	8	343	349	311	89	508	394
" " " 22..	1	6	235	221	194	88	327	240
Totals.....	37	169	7,407	7,092	6,349	89	10,535	8,066

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE A—Continued.

SCHOOLS.	TEACHERS.		NUMBER OF PUPILS.					
	Males.	Females.	On Roll December, 1898.	Average Roll for the Year.	Average Attendance for the Year.	Percentage of Attendance.	Whole Number in School During Year.	In School During the Year Excluding Duplicate Enrollment.
Female Grammar No. 1.	....	9	306	310	262	85	451	367
" " " 2.	....	12	464	438	373	85	682	494
" " " 3.	....	5	187	158	144	91	252	157
" " " 4.	....	10	345	315	281	89	469	329
" " " 5.	....	8	307	283	242	85	410	309
" " " 6.	....	12	427	423	376	90	587	462
" " " 7	....	12	461	422	377	89	611	475
" " " 8.	....	11	410	423	359	85	621	497
" G. and P. " 9.	....	5	117	122	85	70	184	175
" Grammar " 10.	....	12	420	386	346	90	582	421
" " " 11.	....	11	407	376	318	85	558	399
" " " 12.	....	10	380	355	310	87	563	401
" " " 13.	....	8	261	257	221	86	382	294
" " " 15	....	15	571	557	516	92	797	629
" " " 16.	....	10	380	378	299	79	516	496
" " " 17.	....	10	359	318	287	90	447	345
" " " 18.	....	9	338	329	287	87	486	374
" " " 19.	....	11	411	418	364	87	571	503
" " " 20.	....	19	752	726	611	85	1,029	795
" " " 21.	....	12	452	423	374	89	621	466
Totals	....	211	7,755	7,417	6,432	87	10,819	8,388
English-German No. 1.	2	10	355	358	318	88	486	451
" " " 2.	2	26	1,028	1,031	969	94	1,277	1,234
" " " 3.	4	37	1,718	1,696	1,493	88	2,183	2,065
" " " 4.	3	31	1,333	1,335	1,184	89	1,696	1,621
" " " 5.	3	25	1,104	1,084	976	90	1,418	1,311
" " " 6.	4	24	1,127	1,093	966	88	1,410	1,334
" " " 7.	2	12	486	431	380	88	572	522
Totals	20	165	7,151	7,028	6,286	88	9,042	8,538

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.
TABLE A—Continued.

SCHOOLS.	TEACHERS.		NUMBER OF PUPILS.					
	Males.	Females.	On Roll December, 1898.	Average Roll for the Year.	Average Attendance for the Year.	Percentage of Attendance.	Whole Number in School During Year.	In School During the Year Excluding Duplicate Enrollment.
Male Primary No. 1		8	266	256	215	84	415	367
" " " 2		6	231	228	199	87	348	346
" " " 3		12	449	411	368	90	622	596
" " " 4		7	242	251	233	93	363	334
" " " 5		11	386	400	342	85	539	516
" " " 6		8	295	369	313	85	522	507
" " " 7		5	191	187	147	79	278	267
" " " 8		7	236	240	198	82	343	324
" " " 10		4	161	160	126	79	254	237
" " " 11		14	511	488	414	85	728	662
" " " 12		10	338	356	287	81	483	450
" " " 13		5	204	198	152	77	276	265
" " " 14		8	234	253	222	88	367	339
" " " 15		10	339	343	297	86	511	478
" " " 16		7	251	240	195	81	365	345
" " " 17		7	241	230	191	83	329	309
" " " 18		5	178	194	175	90	288	269
" " " 19		4	131	134	117	88	204	183
" " " 20		22	824	841	673	80	1,201	1,124
" " " 21		8	253	246	197	80	381	361
" " " 22		8	313	303	252	83	435	408
" " " 23		8	284	298	248	83	435	409
" " " 24		8	280	290	244	84	414	393
" " " 25		10	345	346	284	82	477	461
" " " 26		5	185	178	157	88	281	256
" " " 27		9	286	292	243	83	416	387
" " " 28		9	307	291	253	87	404	391
" " " 29		5	173	168	147	88	240	226
" " " 30		14	555	550	446	82	809	757
" " " 31		5	170	161	129	80	235	209
" " " 32		9	289	282	248	88	408	379
" " " 33		9	309	313	273	87	428	398
" " " 34		6	264	239	194	81	367	341
" " " 35		6	200	216	178	82	290	276
" " " 36		6	231	222	185	83	306	279
" " " 37		6	270	242	192	79	381	345
" " " 38		5	195	244	209	86	334	330
" " " 39		5	158	163	146	90	249	236
" " " 40		8	303	286	256	90	312	107
Totals		309	11,078	11,109	9,345	84	16,039	14,867

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE A—Continued.

SCHOOLS.	TEACHERS.		NUMBER OF PUPILS.					
	Males.	Females.	On Roll December, 1898.	Average Roll for the Year.	Average Attendance for the Year.	Percentage of Attendance.	Whole Number in School During Year.	In School During the Year Excluding Duplicate Enrollment.
Female Primary No. 1		8	300	291	218	75	462	420
" " " 2		8	265	250	210	84	368	349
" " " 3		13	507	497	403	81	701	666
" " " 4		8	275	255	211	83	395	368
" " " 5		11	401	411	320	78	583	552
" " " 6		8	270	359	302	84	519	509
" " " 7		6	215	224	174	78	337	304
" " " 8		5	193	186	149	80	284	255
" " " 10		5	197	195	146	75	288	268
" " " 11		14	496	497	405	81	728	680
" " " 12		9	298	307	259	84	429	401
" " " 13		6	215	208	168	80	302	285
" " " 14		6	205	211	186	88	305	289
" " " 15		9	332	348	288	83	517	467
" " " 16		6	240	237	185	78	341	316
" " " 17		8	277	286	230	80	406	390
" " " 18		5	176	188	154	82	261	240
" " " 19		4	143	135	120	89	198	185
" " " 20		19	735	707	593	84	1,035	957
" " " 21		6	200	213	175	82	320	289
" " " 22		9	308	285	237	83	432	412
" " " 23		9	318	328	280	85	465	441
" " " 24		8	307	328	277	85	484	458
" " " 25		8	278	285	218	77	414	400
" " " 26		5	186	184	154	84	283	259
" " " 27		9	285	292	245	84	400	381
" " " 28		9	290	290	255	88	381	374
" " " 29		5	162	164	130	80	237	232
" " " 30		15	596	549	450	82	806	722
" " " 31		4	161	173	147	85	256	231
" " " 32		7	232	236	192	81	351	330
" " " 33		8	277	278	223	81	394	366
" " " 34		6	232	202	166	82	318	283
" " " 35		5	178	185	148	80	260	250
" " " 36		5	200	203	169	83	265	247
" " " 37		6	248	230	169	73	343	293
" " " 38		5	182	222	169	76	317	308
" " " 39		4	127	107	95	88	162	144
" " " 40		8	304	290	257	89	317	63
Totals		299	10,811	10,836	8,877	82	15,664	14,384

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE A—Continued.

SCHOOLS.	TEACHERS.		NUMBER OF PUPILS.					
	Males.	Females.	On Roll December, 1898.	Average Roll for the Year.	Average Attendance for the Year.	Percentage of Attendance.	Whole Number in School During Year.	In School During the Year Excluding Duplicate Enrollment.
Colored Gram. No. 1..	1	7	403	412	324	79	596	467
Male Col'd Gram. No. 2.	2	1	84	147	127	87	239	219
Fem. " " " 2....		3	116	119	101	84	127	8
Colored Grammar No. 3	1	7	245	239	215	90	356	268
" " " 4	2	3	216	142	120	85	254	34
Male Colored No. 1....	2	3	212	205	139	68	291	285
" " " 2....	4	4	326	253	188	74	382	354
" " " 3....	2	9	401	384	322	84	496	492
" " " 4....	2	9	478	440	339	77	664	648
" " " 5...	1	3	161	154	120	78	198	196
" " " 6....	2	4	222	211	157	74	290	290
" " " 7....	2	12	544	480	396	83	703	680
" " " 8....	2	7	348	309	226	73	431	425
" " " 9....	9	9	831	745	601	80	1,103	1,082
" and F. G. " 10....	4	11	619	621	450	72	1,020	975
Fem. Colored No. 1.....		9	370	344	236	68	486	470
" " " 2.....		8	343	272	187	69	402	366
" " " 3.....		12	459	422	330	79	569	563
" " " 4.....		11	438	390	314	81	553	530
" " " 5.....		5	199	189	129	68	260	253
" " " 6.....		6	231	221	162	73	321	314
" " " 7.....		17	733	675	576	85	980	961
" " " 8.....		10	326	308	240	78	443	436
" " " 9.....		20	847	811	660	81	1,179	1,151
Totals.....	36	190	9,152	8,493	6,659	79	12,343	11,467

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE A—Continued.

SCHOOLS.	TEACHERS.		NUMBER OF PUPILS.					
	Males.	Females.	On Roll December, 1898.	Average Roll for the Year.	Average Attendance for the Year.	Percentage of Attendance.	Whole Number in School During Year.	In School During the Year Excluding Duplicate Enrollment.
Annex No. 1		8	293	284	231	82	385	360
" " 2	2	24	1,053	998	841	84	1,326	1,214
" " 3, Male Gram	1	7	240	253	214	85	380	303
" " 3, Fem. Gram		11	437	385	333	86	565	409
" " 3, Fem. Prim		10	399	351	285	81	555	504
" " 4		12	475	445	363	82	648	610
" " 5		7	258	264	196	74	351	339
" " 6	1	8	312	296	254	86	442	334
" " 7	1	9	359	359	279	78	519	486
" " 8	1	22	884	906	739	82	1,367	1,229
" " 9	1	6	295	282	217	77	385	360
" " 10, Grammar	1	3	162	153	133	87	228	171
" " 11	1	13	569	549	467	85	748	680
" " 13	1	20	722	764	639	84	1,130	1,032
" " 14	1	3	102	105	92	87	165	142
" " 15	1	10	428	395	333	84	604	499
" " 16		11	404	340	291	86	534	498
" " 17		7	236	245	203	83	356	334
" " 18, Male Gram	2	4	228	222	200	90	312	233
" " 18, Fem. Gram		7	265	250	226	90	349	272
" " 18, Primary		8	291	245	203	82	365	320
" " 19		6	215	211	172	82	298	275
" " 20		7	249	196	162	82	334	131
" " 21		2	39	39	36	92	47	47
" " 1, Colored	1	3	154	144	116	80	209	194
" " 2, "	1	1	91	75	46	61	115	114
" " 3, "	1	2	100	83	53	64	143	142
Totals	17	231	9,260	8,839	7,324	83	12,860	11,232

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE A—Continued.

NIGHT SCHOOLS.	TEACHERS.		NUMBER OF PUPILS.					
	Males.	Females.	On Roll December, 1898.	Average Roll for the Year.	Average Attendance for the Year.	Percentage of Attendance.	Whole Number in School During Year.	In School During the Year Excluding Duplicate Enrollment.
Bohemian Night	2	3	138	138	77	56	145	145
Night No. 1	3		126	89	33	37	188	188
Night Male No. 2	8		271	211	146	70	551	551
" Fem. " 2		7	247	166	96	58	486	486
" " " 3	1	4	121	110	67	61	331	331
" " " 5	1	1	50	51	21	41	101	101
" " " 8	1	1	54	42	25	60	112	112
" " " 11	1	2	65	63	43	67	90	90
" " " 12	6		204	192	108	57	367	367
" " " 17	3	1	107	118	78	66	252	252
Col'd Night " 1	2	1	136	104	47	46	277	277
" " " 3	1	3	104	118	48	41	294	294
" " " 4	2		115	107	41	39	227	227
Annex " " 7	1	3	51	134	37	28	222	222
	32	26	1,789	1,643	867	53	3,643	3,643
Balto. Polytechnic Inst.	23		760	571	246	43	1,436	1,436
Col'd " "	7		71	54	39	73	71	71
Totals	62	26	2,620	2,268	1,152	50	5,150	5,150

SCHOOLS.	Number of Schools, December, 1898.	NUMBER OF TEACHERS.				NUMBER OF PUPILS.					
		Males, December, 1898.	Females, December, 1898.	Totals, December, 1898.	Average for the Year.	On Roll December, 1898.	Average Roll for the Year.	Average Attendance for the Year.	Percentage of Attendance.	Whole Number in School During the Year.	In School During Year Excluding Duplicate Enrollment.
Baltimore City College	1	16	.....	16	16	664	631	595	94	999	689
Eastern Female High School	1	1	12	13	13	450	421	392	93	637	424
Western Female High School	1	1	16	17	16	675	643	582	91	1,009	675
Colored High School	1	1	6	7	7	167	157	148	94	217	168
Polytechnic Institute	1	20	.....	20	20	508	484	457	94	861	660
Colored Polytechnic Institute	1	7	.....	7	7	92	99	85	86	137	126
Male Grammar Schools	21	37	169	206	206	7,407	7,092	6,349	89	10,535	8,066
Female Grammar Schools	20	.....	211	211	213	7,755	7,417	6,432	87	10,819	8,388
English-German Schools	7	20	165	185	184	7,151	7,028	6,286	89	9,042	8,538
Male Primary Schools	39	.....	309	309	317	11,078	11,109	9,345	84	16,039	14,867
Female Primary Schools	39	.....	299	299	303	10,811	10,836	8,877	82	15,664	14,384
Colored Schools	24	36	190	226	227	9,152	8,493	6,659	78	12,343	11,467
Annex Schools	27	17	231	248	242	9,260	8,839	7,324	83	12,860	11,232
	183	156	1,608	1,764	1,771	65,170	63,249	53,531	85	91,162	79,684
Special: Music	.....	2	.....	2	2	.....	.....	.....	.....	.....	.....
Special: Drawing	.....	.....	21	21	21	.....	.....	.....	.....	.....	.....
Special: Sewing	.....	.....	30	30	30	.....	.....	.....	.....	.....	.....
Special: Physical Culture	....	2	8	10	10	.....	.....	.....	.....	.....	.....
Totals	183	160	1,667	1,827	1,834	65,170	63,249	53,531	85	91,162	79,684
Night Schools	14	32	26	58	.....	1,789	1,643	867	53	3,643	3,643
Polytechnic Night School	1	23	.....	23	.....	760	571	246	43	1,436	1,436
Col'd Polytechnic Night School	1	7	.....	7	.....	71	54	39	73	71	71
Totals	16	62	26	88	.....	2,620	2,268	1,152	50	5,150	5,150

Tables Accompanying the Superintendent's Report.

TABLE B.

Different Grades of Schools Compared.

	1898.	1897.	Increase	Decrease
No. of pupils in B. C. C. and High Schools..	1,956	1,924	32	.....
No. of pupils in Polytechnic Institute and Colored Polytechnic Institute.....	600	674	.....	74
No. of pupils in Grammar Schools	15,162	15,146	16	.....
" " " " English-German Schools ...	7,151	7,143	8	.....
" " " " Primary Schools.....	21,889	22,089	.....	200
" " " " Colored "	9,152	8,753	399	.....
" " " " Annex "	9,260	8,873	387	.....
Totals.....	65,170	64,602	842	274
Net increase.....			568	.....

TABLE BB.

Different Grades of Classes Compared.

	1898.	1897.	Increase	Decrease
No. of pupils in Fifth Year Course of B. C. C.	43	34	9	.....
No. of pupils in Fourth Year Course of B. C. C. High Schools and Polytechnic Institute ...	207	238	.....	31
No. of pupils in Third Year Course of B. C. C. High Schools and Polytechnic Institute ...	345	317	28	.....
No. of pupils in Sec'd Year Course of B. C. C., Polytechnic Institute and Col. Poly'c Inst.	535	592	.....	57
No. of pupils in First Year Course of B. C. C., Polytechnic Institute and Col. Poly'c Inst.	1,010	888	122	.....
No. of pupils in Preparatory Course of Polytechnic Institute and Col. Poly'c Instit'e..	416	529	.....	113
No. of pupils in Eighth Grade.....	1,519	1,640	.....	121
" " " " Seventh "	2,512	2,471	41	.....
" " " " Sixth "	4,265	4,022	243	.....
" " " " Fifth "	6,274	6,200	74	.....
" " " " Fourth "	8,516	8,272	244	.....
" " " " Third "	9,545	9,434	111	.....
" " " " Second "	11,361	11,592	.....	231
" " " " First "	18,622	18,373	249	.....
Totals.....	65,170	64,602	1,121	553
Net increase.....			568	.....

Tables Accompanying the Superintendent's Report.

TABLE C.

Showing the Number of Pupils and Teachers in the Public Schools on Roll at the time of Making the Report Each Year, from the Year 1829, when the First Public School was Opened, to the Year 1898, Inclusive.

This statement does not include Night Schools, Normal Classes, nor Floating Schools.

The figures for 1888, and subsequently, include the Annex Schools.

Date.	*Teachers.*	*Pupils.*	*Date.*	*Teachers.*	*Pupils.*
1829	3	269	1864	343	15,319
1830	5	402	1865	366	15,957
1831	5	627	1866	402	17,550
1832	5	640	1867	490	22,073
1833	5	544	1868	537	21,903
1834	8	859	1869	540	23,552
1835	8	717	1870	549	23,898
1836	8	814	1871	559	24,479
1837	8	659	1872	581	25,092
1838	8	675	1873	588	26,663
1839	16	1,126	1874	626	27,634
1840	22	1,834	1875	672	29,942
1841	27	2,331	1876	717	31,071
1842	28	2,464	1877	734	32,523
1843	30	2,669	1878	784	34,002
1844	38	3,366	1879	798	35,595
1845	52	4,313	1880	799	35,297
1846	65	5,087	1881	824	35,630
1847	90	6,439	1882	826	35,639
1848	100	6,696	1883	855	37,546
1849	110	6,763	1884	893	38,618
1850	119	7,093	1885	930	39,828
1851	138	8,011	1886	972	39,779
1852	175	9,081	1887	994	41,199
1853	186	9,447	1888	1,119	46,521
1854	207	9,717	1889	1,187	48,850
1855	217	10,588	1890	1,244	50,899
1856	238	11,441	1891	1,301	52,543
1857	245	11,269	1892	1,382	54,406
1858	256	11,587	1893	1,464	57,048
1859	267	11,750	1894	1,557	59,808
1860	284	13,186	1895	1,614	61,271
1861	295	13,424	1896	1,719	63,087
1862	311	13,888	1897	1,794	64,602
1863	333	14,847	1898	1,827	65,170

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE D.

SCHOOLS.	NUMBER OF PUPILS BETWEEN THE AGES OF																TOTALS.
	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	
Baltimore City College									17	102	181	157	98	78	24	7	664
Eastern Female High Sch'l									4	42	105	126	87	69	15	2	450
Western Female High Sch'l									9	59	166	222	153	43	19	4	675
Colored High School										4	12	25	40	50	20	16	167
Totals									30	207	464	530	378	240	78	29	1,956
Polytechnic Institute							6	24	72	117	124	90	57	14	4		508
Col'd Polytechnic Institute									4	7	20	20	16	9	10	6	92
Totals							6	24	76	124	144	110	73	23	14	6	600
Male Grammar No. 1				1	9	34	45	61	75	54	26	6		1			312
" " " 2				2	29	44	71	134	103	70	20	3					476
" " " 3				1	7	17	31	52	44	14	5	1					172
" " " 4					12	44	72	89	63	44	17	9	1				351
" " " 5				2	14	36	49	68	60	39	21	5	1	1			296
" " " 6				1	32	58	59	56	58	39	25	6	1				335
" " " 7					18	61	99	119	94	52	13	2	1	1			460
" " " 8				2	25	55	62	92	90	72	23	10					431
" G. and P. " 9	1	7	9	13	10	14	16	14	14	7	4	1					110

Male Grammar	No.	10					22	55	91	111	89	51	26	7	2			454
" "	"	11				4	27	57	68	92	59	39	21	7	1			375
" "	"	12					17	39	69	106	80	41	14	2				368
" "	"	13					4	14	37	40	45	18	16	4				178
" "	"	15				2	25	52	81	89	90	57	31	10	1			438
" "	"	16	10	50	61	53	46	46	39	36	29	13	3	1				387
" "	"	17				1	23	42	64	79	74	56	19	2				360
" "	"	18					15	40	53	58	68	50	38	12	2			336
" "	"	19				1	23	37	70	91	78	40	27	7	1			375
" "	"	20				4	23	70	99	138	133	100	40	8				615
" "	"	21				1	11	37	58	85	66	52	22	10	1			343
M. and F. Gram.	"	22				1	12	27	33	43	57	38	19	5				235
Totals			11	57	70	89	404	879	1,266	1,653	1,469	946	430	118	12	3		7,407

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE D.—Continued.

SCHOOLS.	NUMBER OF PUPILS BETWEEN THE AGES OF																TOTALS.
	5–6	6–7	7–8	8–9	9-10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	
Female Grammar No. 1				3	8	28	38	70	57	55	30	15	2				306
" " " 2					25	72	83	122	78	50	29	5					464
" " " 3					10	36	45	58	22	14	2						187
" " " 4				6	18	64	86	70	60	28	9	4					345
" " " 5				2	9	58	58	65	61	33	15	5		1			307
" " " 6				2	18	43	70	76	98	65	42	11	1	1			427
" " " 7					21	46	88	109	99	50	34	13	1				461
" " " 8					12	39	53	82	92	81	36	14	1				410
" G. and P. " 9		13	8	6	10	17	6	18	18	8	8	4	1				117
" Grammar " 10				1	20	54	97	107	69	38	27	6	1				420
" " " 11				1	37	44	69	84	75	64	25	7	1				407
" " " 12				1	11	49	81	100	78	46	14						380
" " " 13				3	18	26	43	64	56	38	10	3					261
" " " 15				4	35	81	118	93	99	75	37	23	5	1			571
" " " 16	6	50	59	56	54	50	37	35	24	7	2						380
" " " 17				1	15	60	51	85	87	34	20	6					359
" " " 18				1	12	35	57	62	56	55	37	16	7				338
" " " 19					9	42	42	68	90	58	71	24	4	3			411
" " " 20				5	40	102	143	158	144	98	45	17					752
" " " 21				5	19	61	76	71	95	61	44	16	4				452
Totals	6	63	67	97	401	1,007	1,341	1,597	1,458	958	537	189	28	6			7,755

English-German	No.	1....	12	36	30	40	44	52	31	53	22	23	8	2	2	.....	355
"	"	2....	4	119	139	128	151	142	127	112	76	20	9	1	.....	.....	1,028
"	"	3....	51	171	194	202	276	244	237	203	103	28	7	2	.....	.....	1,718
"	"	4....	18	136	173	146	202	179	190	146	83	47	13	.....	.....	.....	1,333
"	"	5....	4	121	145	137	135	133	149	131	77	52	16	4	.....	.....	1,104
"	"	6....	2	153	176	162	172	147	132	102	59	17	4	1	.....	.....	1,127
"	"	7....	8	81	78	59	64	51	56	44	26	15	3	1	.....	.....	486
Totals.....			99	817	935	874	1,044	948	922	791	446	202	60	11	2	.....	7,151

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE D—Continued.

SCHOOLS.	NUMBER OF PUPILS BETWEEN THE AGES OF																TOTALS.
	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	
Male Primary No. 1.	6	42	47	48	46	31	18	17	8	3	.....	.....	.....	.....	.....	.....	266
" " " 2.	3	32	37	45	38	35	18	17	5	.....	1	.....	.....	.....	.....	.....	231
" " " 3.	8	41	78	74	92	71	52	26	7	.....	.....	.....	.....	.....	.....	.....	449
" " " 4.	2	63	45	42	38	22	18	12	.....	.....	.....	.....	.....	.....	.....	.....	242
" " " 5.	12	69	63	77	65	37	32	16	14	1	.....	.....	.....	.....	.....	.....	386
" " " 6.	3	43	47	74	49	46	15	15	3	.....	.....	.....	.....	.....	.....	.....	295
" " " 7.	3	71	44	35	18	16	2	1	1	.....	.....	.....	.....	.....	.....	.....	191
" " " 8.	4	36	37	43	33	47	23	8	4	1	.....	.....	.....	.....	.....	.....	236
" " " 10.	...	27	30	25	35	14	10	10	7	2	1	.....	.....	.....	.....	.....	161
" " " 11.	13	86	84	112	87	69	35	10	9	6	.....	.....	.....	.....	.....	.....	511
" " " 12.	8	50	76	68	64	31	21	15	5	.....	.....	.....	.....	.....	.....	.....	338
" " " 13.	1	27	48	29	34	26	18	10	10	1	.....	.....	.....	.....	.....	.....	204
" " " 14.	6	38	47	48	45	29	6	10	3	2	.....	.....	.....	.....	.....	.....	234
" " " 15.	...	59	56	77	55	59	14	10	5	3	1	.....	.....	.....	.....	.....	339
" " " 16.	13	32	61	46	33	39	7	11	5	4	.....	.....	.....	.....	.....	.....	251
" " " 17.	1	49	40	47	39	26	15	14	6	4	.....	.....	.....	.....	.....	.....	241
" " " 18.	10	23	40	36	36	19	10	2	.....	2	.....	.....	.....	.....	.....	.....	178
" " " 19.	2	4	20	25	31	26	8	13	1	1	.....	.....	.....	.....	.....	.....	131
" " " 20.	13	131	164	158	143	105	62	23	18	4	2	1	.....	.....	.....	.....	824
" " " 21.	6	33	48	45	38	39	18	18	4	3	1	.....	.....	.....	.....	.....	253
" " " 22.	...	63	45	46	54	48	29	12	10	6	.....	.....	.....	.....	.....	.....	313
" " " 23.	3	47	57	51	44	35	27	13	7	.....	.....	.....	.....	.....	.....	.....	284
" " " 24.	2	54	54	51	51	39	15	10	4	.....	.....	.....	.....	.....	.....	.....	280

Male Primary No. 25.	3	38	57	54	57	68	35	20	8	5									345
" " " 26.	11	18	37	37	27	33	12	7	2		1								185
" " " 27.	12	50	57	48	56	31	16	14	1		1								286
" " " 28.	7	53	54	53	59	27	23	22	7	1	1								307
" " " 29.	8	42	27	28	33	21	10	3		1									173
" " " 30.	1	73	111	133	99	62	37	21	12	6									555
" " " 31.	4	33	37	32	26	17	14	4	3										170
" " " 32.		38	60	66	53	45	12	9	3	3									289
" " " 33.	7	54	67	56	49	37	18	14	4	3									309
" " " 34.	1	41	46	51	53	34	22	9	5	1		1							264
" " " 35.	1	28	29	27	32	32	27	17	5	1	1								200
" " " 36.	10	38	51	42	31	31	15	10	3										231
" " " 37.	1	41	55	49	44	33	30	11	4	2									270
" " " 38.	10	25	38	45	37	22	8	6	4										195
" " " 39.	2	33	22	30	36	21	9	4	1										158
" " " 40.	15	49	52	64	45	28	28	19	3										303
Totals	212	1,774	2,068	2,117	1,905	1,451	789	483	201	66	10	2							11,078

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE D—Continued.

SCHOOLS.	NUMBER OF PUPILS BETWEEN THE AGES OF																TOTALS.
	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	
Female Prim'y No. 1	7	49	51	63	44	36	30	15	4	1							300
" " " 2	14	53	63	46	38	26	23	2									265
" " " 3	35	113	90	85	75	50	39	15	3	2							507
" " " 4	8	61	54	54	39	28	24	6	1								275
" " " 5	16	54	83	72	69	58	31	16	2								401
" " " 6	11	42	46	55	49	32	19	13	3								270
" " " 7	8	41	48	31	40	25	14	8									215
" " " 8	9	38	37	24	48	11	11	12	2	1							193
" " " 10	5	41	34	37	28	22	15	12	2	1							197
" " " 11	14	98	108	97	81	60	24	8	6								496
" " " 12	...	55	66	49	62	33	21	8	4								298
" " " 13	5	36	40	43	33	24	19	10	4	1							215
" " " 14	6	34	37	60	35	26	3	2	2								205
" " " 15	7	40	68	91	61	36	14	12	3								332
" " " 16	2	38	63	73	31	13	9	8	3								240
" " " 17	12	50	62	46	48	28	16	8	7								277
" " " 18	3	23	43	36	37	23	6	3		2							176
" " " 19	2	27	20	25	36	22	7	3	1								143
" " " 20	12	121	149	161	138	77	51	15	8	3							735
" " " 21	1	27	47	44	30	20	19	7	5								200
" " " 22	13	51	52	47	56	40	23	16	7	2	1						308
" " " 23	12	48	65	63	63	30	23	12	1	1							318
" " " 24	15	53	55	50	59	39	22	9	5								307

Female	Prim'y	No. 25	12	51	51	45	67	34	18										278
"	"	" 26	4	26	51	39	30	13	17	5	1								186
"	"	" 27	2	48	45	59	41	49	26	11	3	1							285
"	"	" 28	8	66	65	56	35	26	15	10	9								290
"	"	" 29	8	22	40	31	30	21	5	3	2								162
"	"	" 30	17	74	100	113	134	84	45	21	4	3	1						596
"	"	" 31	14	27	26	29	36	15	8	5	1								161
"	"	" 32	5	35	66	49	40	17	12	7	1								232
"	"	" 33	7	46	49	50	60	34	14	12	5								277
"	"	" 34	5	33	57	40	35	26	27	7	2								232
"	"	" 35	12	25	38	25	30	20	15	10	2	1							178
"	"	" 36	9	27	43	60	33	13	9	5	1								200
"	"	" 37	7	45	45	32	49	33	19	14	3	1							248
"	"	" 38	10	32	32	39	28	20	12	9									182
"	"	" 39	4	27	21	31	16	10	12	1	5								127
"	"	" 40	13	44	58	51	59	41	23	8	5	1	1						304
Totals			354	1,821	2,168	2,101	1,923	1,215	740	348	117	21	3						10,811

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE D—Continued.

SCHOOLS.	NUMBER OF PUPILS BETWEEN THE AGES OF															TOTALS.
	5–6	6–	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	
M. & F. Gram. Col'd No. 1.						2	18	45	75	79	79	65	37	3			403
Male Gram. " " 2.						4	13	16	23	18	7	2	1				84
Female " " " 2.						4	5	13	20	34	21	11	7	1			116
M. & F. " " " 3.						2	10	27	52	59	56	31	3	4	1		245
M. & F. Gram. " " 4.						5	20	36	33	44	40	19	16	1	1	1	216
Male Colored No. 1.		11	19	29	22	39	25	29	18	14	4	1	1				212
" " " 2.	9	27	34	40	54	42	27	40	26	22	3	2					326
" " " 3.		26	37	40	54	55	52	56	44	22	9	6					401
" " " 4.		53	63	69	65	69	46	54	32	15	9	2	1				478
" " " 5.		9	19	17	23	16	21	12	19	10	12	3					161
" " " 6.		29	27	30	27	35	24	18	18	8	5	1					222
" " " 7.		39	62	50	56	83	51	63	50	42	32	14	2				544
" " " 8.	3	37	56	43	41	47	44	35	22	12	7	1					348
" " " 9.	51	91	90	97	101	98	90	77	66	54	13	1		1		1	831
M. G. & P. " " 10.	17	33	39	63	50	66	62	63	57	57	45	41	22	3	1		619
Female Colored No. 1.	9	23	42	40	38	45	35	42	40	29	23	2	2				370
" " " 2.	6	27	36	36	42	43	35	57	33	22	5	1					343
" " " 3.		46	52	54	42	75	66	52	43	22	6	1					459
" " " 4.	1	39	64	59	62	63	49	45	35	16	4		1				438
" " " 5.		29	22	28	22	25	23	21	15	6	6	2					199
" " " 6.	1	23	24	28	31	32	23	27	14	20	7	1					231
" " " 7.		47	83	93	66	100	90	88	82	48	26	6	4				733
" " " 8.	1	31	34	40	42	56	35	35	31	18	2	1					326
" " " 9.	19	79	108	105	122	114	104	83	64	33	33	13	3				847
Totals.	117	699	911	961	960	1,116	959	1,031	905	709	445	222	98	14	3	2	9,152

TABLE D—Continued.

SCHOOLS.	NUMBER OF PUPILS BETWEEN THE AGES OF															TOTALS.
	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	
Annex No. 1	3	34	34	45	37	43	37	30	10	15	4	1					293
" " 2	17	49	154	142	144	131	129	85	84	54	46	18					1,053
" " 3, Male Gram.					6	25	39	46	58	30	25	7	3		1		240
" " 3, Fem. "				1	19	57	75	80	77	64	46	14	3	1			437
" " 3, " Prim.	10	53	73	100	73	45	27	9	5	4							399
" " 4	11	71	105	86	87	56	37	18	4								475
" " 5	2	41	45	69	37	30	19	11	3	1							258
" " 6				3	25	55	61	72	46	29	17	3	1				312
" " 7	5	39	38	52	34	54	48	38	26	15	6	3	1				359
" " 8	6	93	119	92	121	99	92	96	81	51	28	5	1				884
" " 9	3	25	34	35	39	30	41	31	28	23	6	2					295
" " 10				1	3	22	22	40	32	24	14	4					162
" " 11	9	56	74	51	65	67	77	53	63	30	18	6					569
" " 13	15	111	103	90	108	71	79	61	47	20	17						722
" " 14		9	12	11	14	6	8	19	8	10	2	3					102
" " 15	4	26	40	45	48	55	58	54	42	33	15	8					428
" " 16	3	68	71	90	62	49	31	20	5	4	1						404
" " 17		39	39	46	42	40	18	8	3	1							236
" " 18, Male Gram.				1	8	42	41	47	34	36	14	5					228
" " 18, Fem. "					19	39	37	55	54	25	23	12	1				265
" " 18, Primary	16	63	64	62	41	35	7	1	1	1							291
" " 19	1	24	18	21	30	27	30	29	16	13	6						215
" " 20	11	55	42	41	50	24	14	8	3	1							249
" " 21	3	7	3	10	4	3	2	3	1	2	1						39
" Colored No. 1	3	10	20	15	20	19	20	17	15	10	5						154
" " " 2		9	9	12	7	8	12	10	10	9	2	1	1	1			91
" " " 3	3	2	9	11	8	9	15	13	13	13	3			1			100
Totals	125	884	1,106	1,130	1,151	1,141	1,076	954	769	518	299	92	11	3	1		9,260

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE D—Concluded.

RECAPITULATION.

SCHOOLS.	NUMBER OF PUPILS BETWEEN THE AGES OF															TOTALS.
	5–6	6–7	7–8	8–9	9–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	
College and High									30	207	464	530	378	240	78	29	1,956
Polytechnic Institutes							6	24	76	124	144	110	73	23	14	6	600
Male Grammar	11	57	70	89	404	879	1,266	1,653	1,469	946	430	118	12	3			7,407
Female Grammar	6	63	67	97	401	1,007	1,341	1,597	1,458	958	537	189	28	6			7,755
English-German	99	817	935	874	1,044	948	922	791	446	202	60	11	2				7,151
Male Primary	212	1,774	2,068	2,117	1,905	1,451	789	483	201	66	10	2					11,078
Female Primary	354	1,821	2,168	2,101	1,923	1,215	740	348	117	21	3						10,811
Colored	117	699	911	961	960	1,116	959	1,031	905	709	445	222	98	14	3	2	9,152
Annex	125	884	1,106	1,130	1,151	1,141	1,076	954	769	518	299	92	11	3	1		9,260
Totals	924	6,115	7,325	7,369	7,788	7,757	7,099	6,881	5,471	3,751	2,392	1,274	602	289	96	37	65,170

Tables Accompanying the Superintendent's Report.

TABLE E.

Statement Showing the Number of Pupils in Each Grade.

Schools. College, High and Polytechnic.	Fifth Year.	Fourth Year.		Third Year.		Second Year.		First Year.		Preparatory.			Totals.	
	Males.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males, Sixth Grade.	Males, Seventh Grade.	Males, Eighth Grade.	Males.	Females.
Balto. City College	43	58		107		153		303					664	
East. Female High			65		79		118		188					450
West. Female High			65		81		181		348					675
Polytechnic Institute				36		19		76		119	142	116	508	
Polytechnic Inst., Col				7		18		28			19	20	92	
High, Colored		2	17	10	25	7	39	22	45				41	126
Totals	43	60	147	160	185	197	338	429	581	119	161	136	1,305	1,251

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE E—Continued.

GRAMMAR SCHOOLS.	Eighth Grade.	Seventh Grade.	Sixth Grade.	Fifth Grade.	Fourth Grade.	TOTALS.
Male No. 1	30	43	73	74	92	312
" " 2	32	57	78	121	188	476
" " 3	5	9	32	35	91	172
" " 4	21	58	48	98	126	351
" " 5	20	26	49	82	119	296
" " 6	21	48	59	78	129	335
" " 7	23	33	74	136	194	460
" " 8	25	52	85	114	155	431
" " 10	22	32	68	139	193	454
" " 11	19	35	52	98	171	375
" " 12	10	28	48	107	175	368
" " 13	15	28	30	47	58	178
" " 15	34	62	85	124	133	438
" " 17	22	50	93	90	105	360
" " 18	34	44	66	90	102	336
" " 19	41	52	88	93	101	375
" " 20	43	71	109	165	227	615
" " 21	25	34	73	103	108	343
Totals	442	762	1,210	1,794	2,467	6,675
Female No. 1	18	40	76	86	86	306
" " 2	27	36	81	129	191	464
" " 3	11	12	24	40	100	187
" " 4	21	36	51	81	156	345
" " 5	23	31	67	72	114	307
" " 6	41	73	90	108	115	427
" " 7	28	55	92	111	175	461
" " 8	22	56	86	113	133	410
" " 10	12	32	59	108	209	420
" " 11	40	55	65	101	146	407
" " 12	13	28	58	120	161	380
" " 13	24	41	46	61	89	261
" " 15	55	64	121	139	192	571
" " 17	19	37	64	81	158	359
" " 18	29	43	77	84	105	338
" " 19	71	79	81	98	82	411
" " 20	74	77	163	202	236	752
" " 21	24	67	75	146	140	452
Totals	552	862	1,376	1,880	2,588	7,258

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE E—Continued.

PRIMARY SCHOOLS.	Third Year.	Second Year.	First Year.	Totals.	PRIMARY SCHOOLS.	Third Year.	Second Year.	First Year.	Totals.
Male No. 1...	74	73	119	266	Female No. 1..	67	93	140	300
" " 2...	39	55	137	231	" " 2..	29	62	174	265
" " 3...	104	130	215	449	" " 3..	104	113	290	507
" " 4...	70	62	110	242	" " 4..	62	76	137	275
" " 5...	108	107	171	386	" " 5..	96	109	196	401
" " 6...	77	89	129	295	" " 6..	64	89	117	270
" " 7...	27	68	96	191	" " 7..	46	60	109	215
" " 8...	57	71	108	236	" " 8..	37	68	88	193
" " 10...	34	49	78	161	" " 10..	42	50	105	197
" " 11...	116	172	223	511	" " 11..	119	158	219	496
" " 12...	97	92	149	338	" " 12..	97	84	117	298
" " 13...	34	54	116	204	" " 13..	46	60	109	215
" " 14...	90	68	76	234	" " 14..	62	57	86	205
" " 15...	91	114	134	339	" " 15..	120	112	100	332
" " 16...	54	80	117	251	" " 16..	58	85	97	240
" " 17...	68	70	103	241	" " 17..	68	67	142	277
" " 18...	61	39	78	178	" " 18..	47	45	84	176
" " 19...	53	45	33	131	" " 19..	37	44	62	143
" " 20...	209	218	397	824	" " 20..	207	208	320	735
" " 21...	63	76	114	253	" " 21..	50	46	104	200
" " 22...	73	99	141	313	" " 22..	89	93	126	308
" " 23...	57	75	152	284	" " 23..	83	92	143	318
" " 24...	48	74	158	280	" " 24..	61	102	144	307
" " 25...	57	133	155	345	" " 25..	40	75	163	278
" " 26 ..	49	64	72	185	" " 26..	55	44	87	186
" " 27...	61	68	157	286	" " 27..	73	68	144	285
" " 28...	50	115	142	307	" " 28..	72	82	136	290
" " 29...	52	32	89	173	" " 29..	30	51	81	162
" " 30...	147	173	235	555	" " 30..	171	189	236	596
" " 31...	59	30	81	170	" " 31..	43	42	76	161
" " 32...	93	89	107	289	" " 32..	64	77	91	232
" " 33...	81	95	133	309	" " 33..	80	72	125	277
" " 34...	52	81	131	264	" " 34..	43	69	120	232
" " 35...	42	61	97	200	" " 35..	35	47	96	178
" " 36...	60	67	104	231	" " 36..	51	71	78	200
" " 37...	70	61	139	270	" " 37..	43	78	127	248
" " 38...	44	60	91	195	" " 38..	46	63	73	182
" " 39...	32	47	79	158	" " 39..	31	35	61	127
" " 40...	69	72	162	303	" " 40..	77	104	123	304
Totals.....	2,722	3,228	5,128	11,078	Totals.....	2,645	3,140	5,026	10,811

TABLE E—Continued.

MIXED SCHOOLS.	8th grade		7th grade		6th grade		5th grade		4th grade.		3d grade.		2d grade.		1st grade.		TOTALS.	
	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem
Male Gram. & Prim. No. 9.	3	....	5	....	13	....	13	....	18	.....	23	.....	12	.....	23	.....	110	.....
Fem. " " " " 9.	.....	13	.....	9	.....	10	.....	15	.....	20	.....	13	.....	11	.....	26	.....	117
Male Grammar No. 16.	.....	.....	2	....	12	....	27	....	47	.....	52	.....	83	.....	164	.....	387	.....
Female " " 16.	.....	.....	.....	6	.....	15	.....	24	.....	61	.....	63	.....	76	.....	135	.....	380
Grammar " 22.	5	9	22	16	30	14	40	18	44	37	.....	.....	.....	.....	.....	.....	141	94
English-German No. 1.	7	3	5	8	18	10	27	17	24	34	23	39	42	22	44	32	190	165
" " " 2.	7	17	15	10	31	21	63	40	91	85	89	75	94	94	177	129	567	461
" " " 3.	12	5	21	29	41	39	83	88	132	117	141	139	191	179	230	261	851	867
" " " 4.	8	15	25	22	68	45	75	81	92	86	123	113	133	117	175	165	699	634
" " " 5.	14	9	24	36	34	50	55	64	74	63	104	104	113	109	146	95	564	540
" " " 6.	3	2	4	6	16	10	44	28	87	85	107	125	102	103	189	216	552	575
" " " 7.	2	31	9	5	11	11	21	22	38	35	65	38	58	51	62	57	266	220
M.& F. Colored Gram. No. 1	16	2	14	41	18	72	102	108	.....	.....	.....	.....	.....	.....	.....	.....	150	253
Male Colored Gram. No. 2.	6	....	12	....	30	....	36	....	.....	.....	.....	.....	.....	.....	.....	.....	84	.....
Fem. " " " 2.	.....	15	.....	31	.....	37	.....	33	.....	.....	.....	.....	.....	.....	.....	.....	.....	116
M. & F. " " " 3.	5	13	8	14	36	47	74	48	.....	.....	.....	.....	.....	.....	.....	.....	123	122
M. & F. Col'd Gram. No. 4	3	11	8	14	29	42	60	49	.....	.....	.....	.....	.....	.....	.....	.....	100	116
Male " " 1	.....	.....	.....	.....	.....	.....	.....	.....	36	.....	41	.....	53	.....	82	.....	212	.....
" " " 2	.....	.....	.....	.....	.....	.....	.....	.....	42	.....	62	.....	58	.....	164	.....	326	.....
" " " 3	.....	.....	.....	.....	.....	.....	.....	.....	64	.....	71	.....	74	.....	192	.....	401	.. ..
" " " 4	.....	.....	.....	.....	.....	.....	.....	.....	48	.....	79	.....	123	.....	228	.....	478	....
" " " 5	.....	.....	.....	.....	14	....	17	....	18	.....	31	.....	39	.....	42	....	161	.....

Male Colored No. 6											24		35		39		124		222	
" " " 7			7		11		35				55		62		124		250		544	
" " " 8							23				37		56		86		146		348	
" " " 9											115		148		217		351		831	
Male & Fem. Col'd No. 10.	5	21	5	11	14	28	22	30	27	41	52	52	52	67	83	109	260	359		
Female Colored No. 1										34		72		92		172		370		
" " " 2										45		76		91		131		343		
" " " 3										59		81		95		224		459		
" " " 4										73		58		108		199		438		
" " " 5						10		25		16		35		43		70		199		
" " " 6										31		32		39		129		231		
" " " 7				19		21		38		68		124		133		330		733		
" " " 8								27		38		57		53		151		326		
" " " 9										79		131		250		387		847		
Totals	96	166	186	277	426	482	817	755	1,113	1,107	1,364	1,427	1,693	1,733	2,872	3,018	8,567	8,965		

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE E—Continued.

ANNEX SCHOOLS.	8th grade		7th grade.		6th grade.		5th grade.		4th grade.		3d grade.		2d grade.		1st grade.		TOTALS.	
	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem	Males	Fem
Annex No. 1					9	9	13	12	25	10	20	42	22	25	49	57	138	155
" " 2	22	13	41	33	56	46	65	68	83	75	73	77	75	67	153	106	568	485
" " 3, Male	24		27		63		49		77								240	
" " 3, Female		32		52		94		136		123								437
" " 3, " Prim.												111		110		178		399
" " 4											65	47	86	65	110	102	261	214
" " 5											28	28	45	38	62	57	135	123
" " 6	4	16	10	24	18	36	30	54	60	60							122	190
" " 7	6	5	1	10	16	12	26	13	34	23	28	33	24	34	40	54	175	184
" " 8	12	8	21	16	33	44	41	45	66	68	67	72	101	79	110	101	451	433
" " 9	2	2	4	6	14	16	13	19	22	20	26	23	33	22	32	41	146	149
" " 10	8	6	11	12	17	18	13	24	26	27							75	87
" " 11	10	10	18	9	24	19	33	33	33	39	49	46	40	46	91	69	298	271
" " 13	3	1	2	7	17	20	24	37	40	43	63	61	75	75	122	132	346	376
" " 14		3	2	2	4	6	11	9	2	11	11	4	8	6	9	14	47	55
" " 15	9	10	12	14	23	26	28	32	38	35	39	26	26	27	39	44	214	214
" " 16											83		110		211		404	
" " 17											30	34	23	39	63	47	116	120
" " 18, M Gram.	25		35		37		59		72								228	
" " 18, F. "		32		44		61		76		52								265
" " 18, Primary											37	32	46	36	71	69	154	137
" " 19			2	6	8	11	23	10	22	19	18	10	20	10	28	28	121	94
" " 20											17	18	39	22	81	72	137	112
" " 21					2	1	1	4		3	3	3	5	1	11	5	22	17

Annex No. 1, Colored		2	2	4	2	2	5	8	9	16	15	22	20	22	25	76	78
" " 2, "				2		6	6	4	4	6	8	12	8	20	15	50	41
" " 3, "					3	3	5	5	3	12	6	13	12	22	16	55	45
Totals, males	125	188	347	440	617	691	825	1,346	4,579										
" females	138	237	424	588	624	696	742	1,232	4,681										
Male Gram. Schools	442	762	1,210	1,794	2,467											6,675	
Fem. " "	552	862	1,376	1,880	2,588											7,258	
Male Prim. "						2,722	3,228	5,128	11,078										
Fem. " "						2,645	3,140	5,026	10,811										
Mixed "	96	166	186	277	426	482	817	755	1,113	1,107	1,364	1,427	1,693	1,733	2,872	3,018	8,567	8,965	
Totals, males	663	856	1,136	1,376	1,983	2,282	3,051	3,223	4,197	4,319	4,777	4,768	5,746	5,615	9,346	9,276	30,899		
" females																	31,715		

TABLES ACCOMPANYING THE SUPERINTENDENT'S REPORT.

TABLE E—Concluded.

RECAPITULATION.

	MALES.	FEMALES.	TOTALS.
Number in fifth year, Baltimore City College.	43	.....	43
" in fourth year, B. C. C. and High...	60	147	207
" in third year, B. C. C., High and Polytechnic.....	160	185	345
" in second year, B. C. C., High and Polytechnic.....	197	338	535
" in first year, B. C. C., High and Polytechnic.....	429	581	1,010
Totals.....	889	1,251	2,140
Number in Grammar, eighth grade.....	* 782	856	1,638
" " " seventh grade..... ...	†1,297	1,376	2,673
" " " sixth grade	‡2,119	2,282	4,401
" " " fifth grade.....	3,051	3,223	6,274
" " " fourth grade.....	4,197	4,319	8,516
Totals.....	11,446	12,056	23,502
Number in Primary, third grade	4,777	4,768	9,545
" " " second grade.....	5,746	5,615	11,361
" " " first grade...	9,346	9,276	18,622
Totals.....	19,869	19,659	39,528
Number in High.....	889	1,251	2,140
" in Grammar.....	11,446	12,056	23,502
" Primary	19,869	19,659	39,528
Totals...	32,204	32,966	65,170

*Including number in Preparatory Dep't, Polytechnic Institute, 119.
†Including number in Preparatory Dep't, Polytechnic Institute, 161.
‡Including number in Preparatory Dep't, Polytechnic Institute, 136.

REPORT

—— OF THE ——

ASSISTANT SUPERINTENDENT OF PUBLIC INSTRUCTION.

BALTIMORE, January 1, 1899.

Henry A. Wise,
Superintendent Public Instruction:

DEAR SIR: I herewith present you my report of the condition of the primary grade classes of the public schools for the year ending December 31, 1898.

The reports of the principals thereof to me, due January 1, 1899, are in a great majority of cases very full and complete, and give me a better and more satisfactory knowledge of their physical condition and educational advancement than could be acquired through my regular visitation. This field of labor is so extensive that it is utterly impossible for one, however industrious and energetic, to do full justice to the work were it not for the valuable assistance rendered by the principals. In addition to this, my services have mainly been, under the rules of the Board with reference to probationary teachers, required in schools that have such teachers appointed therein. This duty, consisting of the oversight and inspection of the work of more than sixty teachers and the

requirement of reporting upon their efficiency four times a year, has compelled me in a measure to neglect some schools that have no probationary teachers. This is not spoken of as indicating an opinion on my part that such work should not be done, but simply to show that the Superintendent's Department should have such an adequate force that the means now employed to further the interest of the schools and increase their efficiency would be materially increased.

GRADE ASSOCIATIONS.

The Teachers' Grade Associations have, to a very great degree, materially increased the efficiency of our school system. The mere fact of the knowledge of what is being done in the various schools to increase their power and efficiency obtained through the meetings of these associations and their periodical assemblings has done more than any other one thing to improve the methods and increase the zeal of the teaching force in the discharge of their duties. A few extracts from the reports of the principals will substantiate this assertion:

"All the teachers are interested to learn as well as to teach, and therefore attend the grade meetings with profit to themselves and the school."

"Any attempt to compel *our* teachers to attend grade meetings would be unnecessary."

"The teachers are receiving incalculable benefit from the attendance upon grade meetings, so much so that we regard them as a pleasure and not a stern duty."

"The personal supervision of the principal and the character of the subjects discussed at the grade meetings have been very helpful to the teachers in elevating

and broadening the standard of the work. They take more interest in their pupils, and their ways of imparting instruction are more keenly attractive to the children. They show more ardor in trying to develop both the mental and the moral sense."

"The grade meetings cannot be too highly commended. No wiser provision has been devised for the cultivation of teaching power in our schools."

"We are not progressive in the sense of trying every new plan of which we hear, but we are always willing to learn from the experience of others, and to this end we have found the grade meetings very helpful. For a year past we have had a meeting of our own faculty on the Monday following the grade meeting, at which a report from each grade is heard and discussed as fully as time will permit. This we have found to be pleasant and profitable. We have at times found much to amuse us in the wonderful theories advanced and the almost incredible amount and quality of the work accomplished along various lines. But this temptation to speak of successes and encouragements, rather than of failures, is all prevailing. The question-box oftentimes has been the means of bringing out 'the truth, the whole truth, and nothing but the truth,' and is decidely practical."

These extracts are sufficient to demonstrate the practical utility of that closer concentration of effort, which is obtained by organized meetings of teachers. They secure a wider grasp of the work, a broader comprehension of what is necessary to ultimate success and a clearer insight into the methods and aims to be followed in the work of education. They also tone down abnormal ideas inconsiderately formed by some through lack of proper pedagogical

thinking and study. They also uplift the weak and unsteady by showing them their weakness and errors of judgment, produced entirely by indifference and neglect to fit themselves for the work for which they are appointed. These two classes of teachers especially need these grade associations. The first, though pride may be wounded by finding out the fact—patent to others, but obscure to themselves—are very soon healed of their diseases. They reach the common level by association with their fellows and find that superiority in any profession is not "reached by sudden flight." The second class soon find that if success is to be their reward they must toil and labor to reach that standard which will secure that success. It is right here that many fail. If it were not for these associations more would fall by the wayside.

KINDERGARTEN.

For some years our primary schools have been overcrowded with children too young in years and of improper home instruction to be available as proper material for such primary school work as our present course of study requires The introduction of such children retards the advancement of the entire mass. In a few months the first-year children are converted into classes so diverse as to the conditions necessary for intellectual advancement that it becomes almost impossible for a teacher of the best ability to accomplish the work of that grade. Instead of having a homogeneous material to teach, her efforts are frittered away in her endeavors to equalize the conditions of her class. This she finds, when too late, cannot be done, and at the end of the year the discovery is also made that those who, under normal conditions, could

have been well prepared for advancement, have been materially damaged, and those who under no circumstances could have been advanced, have not to any degree been benefited. The fact is we cannot expect in children under seven years of age, unless properly prepared by wise and judicious home education and influences, so much gain in intellectual possessions as we can in the training of the will in correct habits. Our efforts should mainly be exerted with such children towards their training in habits of regularity, punctuality, industry, cleanliness, self control and politeness. The acquisitions of these traits will be of very great advantage to them in all their after years in the acquisition of intellectual possessions. The home training of children generally is not of such a character as to prepare them for the more strict regime of the public school, and what is lacking in that respect should be repaired before entering upon the regular course of study in primary school work. These facts bring me to the question of what should be done with children of such characteristics, who, at so early an age and in such weak conditions, enter our public schools. Many of them are children growing up in poverty and crime, without, to the least extent, coming into contact with the influences of civilization. Others are the children of parents who are so engrossed with the cares and trials incident to the struggle for existence that they find no time, if the disposition and ability exist, to devote to the home preparation and education of their children. These are some of the greatest difficulties that confront the teachers of our primary schools. To the kindergarten system of culture we must look for valuable assistance as to the method of conducting

our course of instruction in the lowest grade of our primary schools. From the kindergarten and from some homes children trained in habit and mind to pursue fully the primary school course are admitted. Others, and these are the great majority, do not possess these advantages. The change most needed, in my judgment, is to postpone the admission of this latter class for one year and give them a course of instruction suitable to their needs and conditions preparatory to their admission to the more strict regime of the primary school. I am of the opinion that if this course be adopted that the objections now urged by the teachers of the first grade to our present course of study will be removed.

In urging this upon your attention, it is with the view of ultimately introducing into our schools the kindergarten system. The above suggestions were adopted by the St. Louis Public Schools and subsequently kindergartens were there established as a component part of the school curriculum. In that and other cities their success has been assured, and the great benefit to be derived from them has been fully demonstrated. My own views have been several times expressed in previous reports. In that of 1887 you will find the following:

"There are many children of our city who have never been under the influence of a true home. Their life is in the streets, in tenement houses of the lowest order, and in resorts where virtue and honor are unknown. They only know cruelty, hunger, cold and wretchedness. The law of kindness is unknown to them. These should be rescued from these nurseries of crime and brought under influences which have a tendency to make of them good citizens. The public

school should take the initiative in the endeavor to save these little ones from chronic pauperism and crime, for the safety of the State and for the sake of humanity, if for no other reason. It is for this that I favor the introduction of the kindergarten into our system in such localities where such children are to be found. The moral training inculcated therein cannot be over estimated. Impressions for good are there made at a time of life which will be lasting. Honesty, politeness, courtesy and graceful movements are taught in such a way as to develop tendencies to become manly and independent in after life. In addition to this, the kindergarten may be made a useful adjunct to the schools. It can do much by instruction in mechanical work to enliven dormant powers and bring into activity the mental resources. By teaching geometrical forms, color, qualities of objects, number, etc., the observation, comparison and invention are trained. The necessity for early attention to the training and discipline of the hand is very apparent. This training should come in very early life and the mastery over the movements of the limbs should be acquired at that age when the body is developing most rapidly. Motion then becomes easy and natural. A pupil whose hands have been properly disciplined can acquire a trade with more ease and rapidity than one whose hands have been idle. The kindergarten meets this demand for early manual training better than anything yet devised, and many of its methods can be very profitably employed all through the primary schools as an introduction to manual training in the higher grades."

At least something should be done to rationalize our system at this point.

VERTICAL PENMANSHIP.

Vertical penmanship is an assured success. The writing of the pupils is legible and therefore the work is easily examined. Much valuable time is saved to the teacher and pupils which can be wisely employed in other branches of study. At the time this system was prescribed for the schools it was deemed wise to place four different systems on the list, from which any Principal was allowed to select the one, that in her judgment, was the most suitable. Having now tried the system for two years, I think it is the proper time to confine the teaching to one particular method. There are but two systems practically used. About 75 per cent. of the schools use the Natural System and the rest the Normal Review. This fact, added to my experience in the use of both systems, leads me to the recommendation that the Natural System should be exclusively used in the Public Schools of Baltimore.

The physical condition of our Primary Schools has been greatly improved during the past few years. The unsanitary conditions complained of in previous reports have been to a very great degree improved. There remain, however, a few schools that no doubt will receive in this respect the attention of the Inspector of Buildings during the present or coming year.

Many of the Primary School buildings are antiquated and entirely unfit for use. With small and contracted rooms, badly lighted, and the means of egress in case of fire barely sufficient, these buildings are a menace both to the health and safety of pupil and teacher.

But while, under present conditions, we cannot entirely rid ourselves of these drawbacks to successful progress, we should do the best we can to make them proper places of habitation for our school children. We rejoice in the evidence of very much better things in the shape of improved school appliances and school-house architecture in the future, and congratulate the next generation of teachers and pupils that they will be, in a great measure, freed from the impediments we have had to encounter in the effort to educate the children of *our* day and generation.

In this connection it is just and proper that I should for myself and in the name of the primary school teachers of Baltimore City thank the ladies composing the Arundel Club and others working in the same direction, for their unselfish labors in their effort to improve the physical condition of our public schools. There is no doubt that whatever improvement in that direction has been made is the result of their untiring energy. And while we thank them for what they have already done, we look forward to their united efforts in securing much greater success in the future than has crowned their labors in the past.

My thanks are due to yourself, the officers and members of the Board for courtesies and assistance in the discharge of my duties. To the teachers especially I am indebted for their valuable aid in my efforts to assist in upbuilding our system of public instruction, and for their unvaried kindness so uniformly extended to me in the capacity of both friend and teacher.

JNO. E. MCCAHAN,
Assistant Superintendent.

Report of Superintendent of Supplies

FOR 1898 AND 1899.

BALTIMORE, April 25, 1899.

Mr. Harry K. Muller,

Chairman Committee on Accounts.

DEAR SIR:

I beg leave to submit my report for work done under my supervision as per order of the Board for 1898.

I have had all furniture in all schools, including Annex and branch schools, put in good condition, desks fastened to the floor, locks put on and the necessary repairs have been made to the furnaces and stoves, also the necessary whitewashing and kalsomining.

The following schools have been kalsomined:

Primary Schools Nos. 6, 28 and 17; Grammar Schools Nos. 10, 20, 18, 5 and 6.

The following schools have had the walls painted:

Primary Nos. 1, 31, a portion of No. 34 and 4, No. 11 complete, and a portion of No. 35.

Grammar Schools Nos. 1, 11, 16.

Annex Schools Nos. 16, 8, 9, 4 and 6, and part of No. 17.

English and German No. 4, and part of No 5.

The following schools have been furnished with additional furnaces:

Primary Nos. 11, 1; 23, 4; 40, 1; 29, 1, and 33, 1.

Grammar Schools Nos. 15, 1; 11, 1; 3, 1; 12, 1, and No. 1, 2.

Annex Schools Nos. 15, 2; 4 and 6, 1.
English and German No. 2, 1.

The stoves were removed from Primary No. 7 and four furnaces substituted, which has given entire satfaction.

Stoves from Colored Grammar No. 4 were removed and one furnace substituted, which we find is a decided improvement.

The Building Inspector has furnished the following schools with a very fine flush system of sanitary closets, that are giving entire satisfaction:

Primary Schools Nos. 23, 14 and 11.
Grammar Schools Nos. 2, 5, 16 and 15.
Eastern Female High School.
Temporary City College.

In addition to these are:

Primary Schools Nos. 4, 34, 30 and Branch.
Annex Schools Nos. 18 and 3.
Grammar Schools Nos. 21 and 7.
Colored School No. 9.

The new building for Grammar No. 7, Male and Female, was completed and delivered to the Committee in the early fall of 1898, and by order of the Board furnished with Buffalo adjustable desks and other furniture to correspond with the interior finish of the building, and is decidedly the most complete Grammar School in the city.

The third floors of Annex No. 18 and Primary No. 4 were also completed by the Inspector of Buildings, and by order of the Board furnished with the necessary furniture—Primary No. 4 with No. 1 Buffalo desks and No. 18 Annex with No. 2 Buffalo desks for the Primary Department in this school. There are four classes occupying two rooms that ought to be

divided by partitions, as it is a matter of impossibility to do good work as the rooms are now arranged.

Primary School No. 40 was by order of the Board organized in September, installed in old Grammar School No. 7, after the furniture was arranged for Primary School purposes.

Annex Schools Nos. 20 and 21 were organized by order of the Board, No. 20 at the corner of North avenue and Payson street, with an Annex at Walbrook avenue, near Payson street. Both of these buildings had been church buildings, and had to be changed by partitions for school purposes. One building contains three class rooms and reception room, and the other four class rooms. Annex No. 21 is situated at North and Walbrook avenues, on the second floor of a frame building, and contains four class rooms, teachers' room and cloak room; is heated with furnace; has sanitary closets and is in all respects a well arranged school, having been built for school purposes.

Colored Grammar School No. 4 was organized during this year and is located in a rented building at the northwest corner of Mulberry and Stricker streets; it contains six class rooms, three very large and three of medium size, and two other rooms not used, with two stairways and one cloak-room; heated by furnace, with sanitary closet for teachers; the one disadvantage is the very small yard.

The following buildings were vacated during the year and leases surrendered:

Branch to Colored Grammar School No. 1, No. 13 Saratoga street.

Branch of Annex No. 6, Canton avenue, near Broadway.

Branch of Grammar School No. 7. This includes also Male Primary No. 38.

Branch of Male Grammar No. 4, Henrietta street, near Sharp street.

The Board also surrendered No. 18 North High Street Branch to Male Primay No. 3, and leased Nos. 124 and 126 North High street, securing this school for the same amount of rent, namely, $50 per month.

The following buildings were leased during the year: One on Walbrook avenue, near Payson, for branch to Annex No. 20, and at North Walbrook for Annex No. 21; the lower floor of the Ark of the Covenant for Male Grammar No. 8; the second floor of Colored Church, Orchard and Tessier streets, for Colored Primary No. 4; building at Stricker and Mulberry streets for Colored Grammar No. 4.

I have made a personal appeal to the firemen to be careful in the use of fuel and also to give strict attention to the conditions of their furnaces, and I am pleased to say that in most cases my instructions have been carefully complied with.

I have also given considerable attention to the ventilation, and in many cases the ventilation has been improved with small cost to the Board.

Because of the sanitary arrangements made by the Building Inspector in the above-mentioned schools, the School Board was compelled to make several changes in the heating apparatus and coal bins, costing in round numbers about $4,000, and again, by the recommendation of the Building Inspector, recommending the change of heat and smoke pipes, because of former faulty construction, it became necessary to spend as much money in the above changes as are set out above.

During the year the building formerly occupied as Female Primary No. 38 was changed by partitions to accommodate the Male Department, formerly occupying the lower story of Frinch's Hall.

The following is a list of old furniture at the warehouse:

668 No. 1 Double Soper Desks.
757 " 2 " " "
634 " 3 " " "

2,059

Also the following list of articles:

10 Organs,
10 Blackboard Steps,
4 Rolls Old Carpet,
3 Umbrella Stands,
17 Assistants' Chairs,
2 Principals' Tables,
61 Assistants' Desks.

About 500 old Baltimore Desks, and a large lot of miscellaneous furniture of very small value.

In conclusion, I would add that my association with members and officers of the Board has been pleasant and agreeable. The kindness and consideration shown me by the principals and teachers have made my duties very pleasant and agreeable. I take this opportunity to thank the officers and members of the Board, and also the principals and teachers, for their uniform kindness to me during the past year.

Following will be found an inventory of the heating apparatus and furniture now in the schools appraised upon two-thirds of their value.

Very respectfully,

JAMES F. MORGAN,
Superintendent of Supplies.

INVENTORY OF FURNITURE, HEATING APPARATUS, ETC., IN THE SCHOOLS DECEMBER 31, 1898.

SCHOOLS.	Number of Seats.	Rear Seats.	Settees.	Teachers' Desks.	Chairs.	Book Cases. Large.	Book Cases. Small.	Black Boards.	Clocks.	Organs.	Pianos.	Wardrobes.	Umbrella Stands.	Wash Stands.	Tables.	Furnaces.	Stoves.	Screens.	Estimated Valuation.
Baltimore City College	939	56	78	16	130	19	1	16	13	1	1	2	.....	.....	8	4	.....	.....	$6,850 00
Eastern Fem. High School	416	25	84	24	125	7	....	22	3	..	2	..	.....	.....	12	4	2	2	5,340 00
Western Fem. High School	798	90	159	18	115	16	7	wall	26	1	1	.....	.....	.....	9	Steam	.....	.....	9,750 00
Balto. Polytechnic Institute	422	46	....	12	954	14	....	wall	13	1	..	.....	.....	.....	16	2	.....	....	5,356 00
Col'd Man'l Train'g School	225	12	....	11	67	8	6	25	1	1	..	1	.....	.....	1	.....	15	22	900 00
Totals	2,800	229	321	81	1,391	64	14	63	56	4	4	5	.....	.....	16	10	17	24	$28,196 00
Male Grammar No. 1	403	64	...	10	36	2	6	34	2	1	..	1	1	1	1	6	1	2	$2,405 00
" " " 2	420	42	....	10	30	2	10	wall	2	1	..	2	6	1	1	Smead	1	1	2,320 00
" " " 3	212	20	2	7	19	1	10	18	1	1	..	2	2	1	1	6	1	1	1,700 00
" " " 4	352	29	2	8	28	1	7	28	1	1	..	2	1	1	2	.....	8	16	1,400 00
" " " 5	364	26	....	7	18	3	6	20	2	1	..	1	2	1	1	.....	8	14	1,200 00
" " " 6	504	44	.....	12	24	1	9	24	1	1	..	1	6	1	1	5	3	2	2,650 00
" " " 7	529	71	....	12	48	14	12	wall	3	1	..	2	.....	.....	4	Steam	2	....	12,331 00
" " " 8	484	56	2	10	44	3	15	wall	2	1	..	2	3	1	1	Smead	1	....	2,850 00
" G. & P. " 9	166	14	3	10	18	1	7	20	2	1	..	1	1	1	1	.....	5	8	600 00
" Grammar " 10	480	39	1	8	26	3	12	36	2	1	..	1	1	1	1	.....	8	16	1,550 00

Male Grammar No. 11.....	424	32	....	8	24	2	7	15	1	1	...	1	1	1	1	6	1	2	1,830	00
" " " 12.....	456	31	....	9	24	1	6	17	1	1	..	2	2	1	1	5	3	6	1,900	00
" " " 13.....	250	29	10	8	22	3	4	20	1	1	..	1	2	1	1	.....	7	12	1,125	00
" " " 15.....	655	63	....	16	36	12	1	48	2	1	..	1	4	1	1	5	1	2	2,850	00
" " " 16.....	452	32	....	8	30	2	7	24	1	1	..	1	1	1	1	6	1	2	2,700	00
" " " 17.....	410	30	....	10	32	2	7	23	1	1	..	1	1	1	1	.....	10	20	1,300	00
" " " 18.....	351	35	....	17	20	2	6	wall	1	1	..	1	2	1	1	Smead	1	1	2,560	00
" " " 19.....	389	32	....	8	38	2	8	wall	2	2	..	1	2	1	1	Smead	1	1	2,470	00
" " " 20.....	780	32	....	11	38	2	10	wall	1	1	..	1	6	1	1	Smead	1	1	2,860	00
" " " 21.....	500	40	....	10	36	2	8	26	2	1	..	2	1	1	1	.....	13	24	1,650	00
" " " 22.....	338	28	3	8	19	2	4	23	1	1	..	1	2	1	1	4	2	3	1,700	00
Totals, Male Grammar..	8,919	789	23	207	601	63	162	401	32	23	..	28	49	21	25	48	80	136	$51,971	00

INVENTORY OF FURNITURE, HEATING APPARATUS, ETC., IN THE SCHOOLS.—Continued.

SCHOOLS.	Number of Seats.	Rear Seats.	Settees.	Teachers' Desks.	Chairs.	Book Cases. Large.	Book Cases. Small.	Black Boards.	Clocks.	Organs.	Pianos.	Wardrobes.	Umbrella Stands.	Wash Stands.	Tables.	Furnaces.	Stoves.	Screens.	Estimated Valuation.
Female Grammar No. 1...	492	40	38	10	26	3	5	36	1	..	1	1	2	1	1	6	1	2	$2,850 00
" " " 2...	531	42	....	10	30	3	10	wall	1	1	..	1	8	1	1	*a*	1	1	2,150 00
" " " 3...	214	19	....	6	17	2	7	20	1	1	..	1	1	1	1	*a*	1	7	900 00
" " " 4...	362	26	15	7	24	2	8	26	1	1	1	1	2	1	2	.....	8	16	1,500 00
" " " 5...	356	30	4	8	15	2	6	20	1	1	..	1	2	1	1	.....	7	16	1,250 00
" " " 6...	516	34	12	9	45	2	6	28	1	..	1	2	4	1	1	*a*	3	4	1,700 00
" " " 7...	542	71	....	12	40	14	12	wall	2	1	....	..	....	....	4	Steam	1	....	5,231 00
" " " 8...	474	46	8	10	40	2	14	wall	1	1	..	1	2	1	1	*a*	1	2	2,400 00
" G. & P. " 9...	174	10	....	6	15	2	1	10	1	1	..	1	3	1	1	.....	7	12	750 00
" Grammar " 10...	492	29	3	9	24	5	4	32	1	1	..	1	1	1	1	.....	8	16	1,500 00
" " " 11...	420	28	...	7	26	2	7	18	2	1	..	2	5	1	1	*a*	1	1	1,250 00
" " " 12...	458	28	5	9	36	1	6	24	1	1	..	4	2	1	2	*a*	3	6	1,300 00
" " " 13...	362	32	7	7	24	2	7	22	1	1	..	1	4	1	1	.....	7	14	1,225 00
" " " 15...	606	45	....	11	35	2	10	14	2	..	1	2	4	1	1	4	2	2	2,700 00
" " " 16...	422	35	....	8	30	2	7	24	1	1	..	4	2	1	1	*a*	1	2	1,850 00
" " " 17...	440	30	....	10	32	2	7	23	1	1	..	1	4	1	1	.....	10	18	1,550 00
" " " 18...	367	35	....	7	20	2	6	wall	1	1	..	1	6	1	1	*a*	1	...	2,400 00
" " " 19...	498	45	....	9	38	2	8	wall	1	1	..	1	4	1	1	*a*	1	....	2,700 00
" " " 20...	696	48	....	12	48	3	12	wall	1	1	..	1	5	1	1	*a*	....	....	2,575 00
" " " 21...	480	31	....	10	24	1	10	32	2	1	..	1	3	1	1	.....	10	20	1,550 00
Totals, Fem. Grammar..	8,802	701	92	177	589	56	153	329	24	17	4	28	64	19	25	10	75	179	$42,081 00

English-German	No.	1	686	42	2	13	25	7	4	28	1	1	1	2	1	1		15	30	$1,950	00
"	"	"	2	1,112	72		20	43	2	16	44	2	2	4	4	2	4	7	2	4	3,800	00
"	"	"	3	1,714	84		26	48	2	19	49	2	2	2	4	2	2	2	14	26	3,900	00
"	"	"	4	1,380	84		24	50	2	16	46	2	2	4	6	2	2	6	2	4	4,300	00
"	"	"	5	1,107	88		26	58	2	18	wall	2	2	2	4	2	2	Smead	1		4,500	00
"	"	"	6	1,314	84		22	58	1	20	wall	2	2	4	20	2	2	Smead	5	10	5,400	00
"	"	"	7	594	40		14	40	4	14	20	2	1	2	2	2	2		14	20	1,611	00
Total, Eng.-Ger				7,907	494	2	145	322	23	107	187	13	12	19	44	13	15	15	53	74	$26,711	00

INVENTORY OF FURNITURE, HEATING APPARATUS, ETC., IN THE SCHOOLS—Continued.

SCHOOLS.	Number of Seats.	Rear Seats.	Settees.	Teachers' Desks.	Chairs.	Book Cases. Large.	Book Cases. Small.	Black Boards	Clocks.	Organs.	Pianos.	Wardrobes.	Umbrella Stands.	Wash Stands.	Tables.	Furnaces.	Stoves.	Screens.	Estimated Valuation.
Male Primary No. 1	434	60	2	12	40	1	9	28	1	1	..	1	3	1	1	a	1	1	$1,600 00
" " " 2	284	22	2	7	24	1	5	18	1	1	..	1	2	1	1	.....	5	9	850 00
" " " 3	506	52	....	9	26	1	7	24	1	1	..	2	2	1	1	a	1	1	1,075 00
" " " 4	300	30	5	6	36	3	6	wall	1	1	..	2	6	1	1	Smead	1	....	2,350 00
" " " 5	538	40	3	8	30	2	7	28	1	1	..	1	2	1	1	6	1	1	2,250 00
" " " 6	452	36	....	9	28	1	7	28	1	1	..	2	4	1	1	.....	10	16	1,600 00
" " " 7	238	24	....	6	24	1	5	14	1	1	..	1	5	1	1	2	3	6	1,100 00
" " " 8	364	38	....	8	26	1	6	8	1	1	..	1	6	1	1	.....	9	17	1,250 00
" " " 10	232	21	2	7	18	2	3	22	1	1	..	1	4	1	2	.....	6	9	950 00
" " " 11	694	38	....	10	28	2	8	10	1	1	..	1	4	1	2	6	1	2	2,880 00
" " " 12	435	42	....	9	28	3	8	28	1	1	.	1	4	1	1	.....	9	16	1,440 00
" " " 13	336	26	....	6	30	1	5	wall	1	1	..	1	3	1	1	Smead	1	....	1,640 00
" " " 14	372	27	....	8	34	1	6	23	1	1	..	2	6	1	1	5	1	2	1,775 00
" " " 15	408	20	....	9	24	1	6	18	1	1	1	1	4	1	1	.....	9	12	1,350 00
" " " 16	356	27	5	6	24	1	4	22	1	1	..	1	5	1	1	5	1	2	1,875 00
" " " 17	332	33	....	6	14	1	4	22	1	1	..	1	4	1	1	.....	8	14	1,000 00
" " " 18	324	26	....	6	26	1	5	18	1	1	..	1	2	1	1	.....	7	11	975 00
" " " 19	148	43	....	5	28	1	4	wall	1	1	..	1	4	1	1	Smead	...	1	1,250 00
" " " 20	778	61	....	17	36	2	13	48	2	1	..	2	12	1	1	.....	16	34	2,350 00
" " " 21	440	31	...	5	11	2	14	18	1	1	..	1	2	1	1	.....	7	14	1,100 00
" " " 22	350	38	11	10	24	1	8	24	1	1	..	1	2	1	1	.....	9	14	1,200 00
" " " 23	396	26	...	6	19	1	5	8	1	1	..	1	4	1	1	4	4	8	2,050 00

Male Primary No. 24				360	40		9	36	2	7	wall	1	1		1	4	1	1	Smead	1	6	$2,200	00
"	"	"	25	434	34		8	40	2	4	wall	1	1		2	4	1	1	Smead	1	1	2,050	00
"	"	"	26	328	20	4	7	18	1	6	22	1	1		1	6	1	1		5	10	900	00
"	"	"	27	362	30		7	18	1	6	26	1	1		1	4	1	1		8	14	1,250	00
"	"	"	28	316	24		6	18	1	6	26	1	1		1	4	1	1		6	12	1,100	00
"	"	"	29	392	24		6	18	1	6	10	1	1		1	4	1	1	5	1	1	2,410	00
"	"	"	30	614	46		10	24	2	6	25	1	1		1	6	1	1	4	1	4	2,240	00
"	"	"	31	308	28		6	29	1	5	wall	1	1		1	6	1	1	Smead	1		1,800	00
"	"	"	32	348	34		8	30	1	5	wall	1	1		1	6	1	1	Smead	1		1,925	00
"	"	"	33	382	28		6	24	1	5	wall	1	1		1	5	1	1	Smead	1		1,800	00
"	"	"	34	330	20		6	10	1	3	wall	1	1		1	6	1	1	Smead	1		1,750	00
"	"	"	35	340	24		6	20	1	6	wall	1	1		1	6	1	1	Smead	1		1,500	00
"	"	"	36	208	10		4	10	1	4	10	1	1		1	4	1	1		4	6	600	00
"	"	"	37	301	30		6	24	1	6	wall	1	1		1	6	1	1	Smead	1		1,600	00
"	"	"	38	366	12		5	12	1	4	10	1	1		1	2	1	1		4	6	600	00
"	"	"	39	626	46		14	20	1		wall	1	1		1	2	1	1	4			2,000	00
"	"	"	40	397	36		8	36	2	12	25	1	1		2	2		1	6		2	2,848	00
Totals, Male Primary				15,039	1,247	34	297	965	52	235	563	40	39	1	46	167	38	41	41	147	255	$63,875	00

INVENTORY OF FURNITURE, HEATING APPARATUS, ETC., IN THE SCHOOLS.—Continued.

SCHOOLS.	Number of Seats.	Rear Seats.	Settees.	Teachers' Desks.	Chairs.	Book Cases. Large.	Book Cases. Small.	Black Boards.	Clocks.	Organs.	Pianos.	Wardrobes.	Umbrella Stands.	Wash Stands.	Tables.	Furnaces.	Stoves.	Screens.	Estimated Valuation.
Female Primary No. 1	520	38	49	14	20	2	8	43	2	1	..	1	2	1	1	a	1	1	$1,540 00
" " " 2	285	18	....	5	14	..	4	18	1	1	..	1	..	1	1	.....	5	10	800 00
" " " 3	308	24	2	6	18	2	8	18	1	1	..	1	..	1	1	a	1	1	950 00
" " " 4	300	30	....	6	36	2	6	wall	1	1	..	1	6	1	1	c	1	....	3,018 00
" " " 5	576	45	2	9	18	1	6	2[illegible]	1	1	..	1	2	1	1	c	1	2	1,475 00
" " " 6	486	35	....	7	28	1	10	20	1	1	..	1	3	1	1	.....	8	14	1,350 00
" " " 7	272	24	....	5	24	1	6	12	1	[illegible]	..	1	4	1	1	c	2	4	750 00
" " " 8	362	35	....	7	26	1	6	8	1	1	..	1	2	1	1	.....	8	15	1,150 00
" " " 10	244	18	....	7	18	1	5	20	1	1	..	1	6	1	1	.....	5	9	850 00
" " " 11	572	40	....	10	23	2	9	16	1	1	..	1	8	1	1	c	1	1	2,475 00
" " " 12	408	33	2	8	20	2	6	28	1	1	..	1	2	1	1	.....	9	9	1,350 00
" " " 13	336	26	....	6	22	1	6	wall	1	1	..	1	3	1	1	c	1	....	1,650 00
" " " 14	388	28	....	6	30	1	7	25	1	1	..	1	5	1	1	c	1	1	1,100 00
" " " 15	392	33	2	10	24	1	6	28	1	1	..	1	4	1	1	.....	9	14	1,350 00
" " " 16	318	27	....	6	20	2	5	22	1	1	..	1	3	1	1	c	....	....	1,000 00
" " " 17	331	28	....	7	16	1	6	24	1	1	..	1	6	1	1	.....	7	14	1,150 00
" " " 18	292	22	....	6	18	1	2	26	1	1	..	1	4	1	1	.....	6	12	850 00
" " " 19	150	20	....	4	24	1	3	wall	1	1	..	1	6	1	1	c	1	....	950 00
" " " 20	278	52	....	17	36	1	11	55	1	1	..	1	8	1	1	.....	18	34	2,250 00
" " " 21	338	31	....	6	18	2	3	20	1	1	..	1	3	1	1	.....	7	14	2,000 00
" " " 22	384	30	11	6	17	1	6	21	1	1	..	1	2	1	1	.....	8	12	1,150 00
" " " 23	412	26	....	6	18	1	5	12	1	1	..	1	2	1	1	c	4	1	1,300 00

Female Primary No. 24	332	42		9	36	1	8	wall	1	1		1	2	1	1	c	4	4	$2,100	00
" " " 25	450	34		8	36	2	7	wall	1	1		1	2	1	1	c	1		2,050	00
" " " 26	260	30		6	18	2	5	20	1	1		1	4	1	1		16	16	950	00
" " " 27	372	42		10	18	1	5	26	1	1		1	4	1	1		14	14	1,250	00
" " " 28	310	27		7	18	1	7	25	1	1		1	3	1	1		14	14	1,100	00
" " " 29	368	24		6	18	2	6	6	1	1		1	2	1	1	c	1	1	1,175	00
" " " 30	382	46		10	18	1	6	30	1	1		1	3	1	1	c	2	2	1,450	00
" " " 31	330	28		6	18	1	5	wall	1	1		1	2	1	1	c	1	1	1,700	00
" " " 32	330	24		6	18	1	5	wall	1	1		1	2	1	1	c	1		1,600	00
" " " 33	360	24		6	18	1	5	wall	1	1		1	2	1	1	c	1		1,675	00
" " " 34	330	20		4	36	1	5	wall	1	1		1	2	1	1	c	1	12	1,750	00
" " " 35	340	24		6	26	1	6	wall	1	1		1	6	1	1	c	1		1,500	00
" " " 36	172	24		4	16	1	4	10	1	1		1	2	1	1		5	8	750	00
" " " 37	303	30		6	27	1	5	wall	1	1		1	2	1	1	c	1		1,600	00
" " " 38	322	12		5	12	1	4	10	1	1		1	1	1	1		6	8	650	00
" " " 39	794	50		12	30	1	6	wall	1	1		1	1	1	1	c			1,400	00
" " " 40	409	36		8	36	3	14	30	1	1		1	8	1	2		2	4	1,348	00
Totals, Female Primary	14,119	1,180	68	283	885	52	237	595	40	39		41	133	38	40		175	252	$54,506	00

INVENTORY OF FURNITURE, HEATING APPARATUS, ETC., IN THE SCHOOLS.—Continued.

SCHOOLS.	Number of Seats.	Rear Seats.	Settees.	Teachers' Desks.	Chairs.	Book Cases. Large.	Book Cases. Small.	Black Boards.	Clocks.	Organs.	Pianos.	Wardrobes.	Umbrella Stands.	Wash Stands.	Tables.	Furnaces.	Stoves.	Screens.	Estimated Valuation.
Colored High School	275	32	....	8	48	4	6	42	1	1	..	2	4	1	2	*d*	1	1	$2,600 00
" Grammar No. 1	422	28	....	6	12	2	7	12	1	1	..	1	2	1	1	.....	1	8	1,200 00
" " " 2	354	36	....	6	18	2	5	14	1	1	..	1	2	1	1	.....	10	18	1,260 00
" " " 3	292	30	....	11	30	6	8	26	1	1	..	1	2	1	1	.....	10	18	1,200 00
" " " 4	185	24	....	6	12	1	6	20	1	1	..	..	1	1	1	6	.....	.....	632 00
Male Colored No. 1	270	24	....	7	16	1	4	12	1	1	..	1	2	1	1	6	1	1	1,860 00
" " " 2	308	30	....	7	22	1	6	20	1	1	..	1	3	1	1	.....	6	10	1,020 00
" " " 3	526	38	....	7	30	1	7	wall	1	1	..	2	1	1	1	8	1	1	2,950 00
" " " 4	376	24	....	6	16	2	6	18	1	1	..	1	1	1	1	.....	6	10	1,000 00
" " " 5	246	20	....	5	18	1	4	15	1	1	..	1	2	1	1	.....	5	10	850 00
" " " 6	288	24	19	6	16	9	2	15	1	1	..	1	2	1	1	.....	6	9	975 00
" " " 7	534	39	....	10	30	1	9	28	1	1	..	1	4	1	1	6	1	2	2,250 00
" " " 8	330	25	....	6	20	2	3	14	1	1	..	1	1	1	1	2	6	10	1,000 00
" " " 9	996	100	....	24	40	2	24	wall	1	1	..	2	2	1	1	Smead	....	....	10,550 00
M. & F. " " 10	498	38	....	9	30	2	9	wall	1	1	..	2	2	1	2	Smead	....	....	1,750 00
Female " " 1	524	24	....	6	24	1	6	18	1	1	..	1	3	1	1	*d*	.....	.....	1,360 00
" " " 2	340	26	....	7	19	2	6	16	1	1	..	1	2	1	1	.....	6	14	1,100 00
" " " 3	542	38	....	10	30	1	7	wall	1	1	..	1	3	1	1	*d*	1	1	2,300 00
" " " 4	334	26	4	8	10	1	4	25	1	1	..	1	3	1	1	.....	6	10	1,000 00
" " " 5	248	20	....	5	18	1	4	15	1	1	..	1	2	1	1	.....	5	10	1,000 00
" " " 6	282	23	11	7	16	1	3	16	1	1	..	1	1	1	1	.....	7	8	1,350 00
" " " 7	546	37	....	12	28	1	11	31	1	1	..	2	1	1	2	*d*	2	4	1,450 00
" " " 8	304	25	....	6	24	1	4	32	1	1	..	1	2	1	1	*d*	3	6	950 00
" " " 9	1,608	100	....	24	40	2	24	wall	1	1	..	2	2	1	1	*d*	.....	.....	4,100 00
Totals, colored	10,628	831	24	206	569	48	175	389	24	24	..	29	52	24	27	27	87	151	$45,015 00

INVENTORY OF FURNITURE, HEATING APPARATUS, ETC., IN THE SCHOOLS—Continued.

SCHOOLS.	Number of Seats.	Rear Seats.	Settees.	Teachers' Desks.	Chairs.	Book Cases. Large.	Book Cases. Small.	Black Boards.	Clocks.	Organs.	Pianos.	Wardrobes	Umbrella Stands.	Wash Stands.	Tables.	Furnaces.	Stoves.	Screens.	Estimated Valuation.
Annex No. 1	312	28	....	6	14	1	4	wall	1	1	..	1	2	1	1	.....	6	10	$650 00
" " 2	1,122	62	....	12	36	2	6	26	1	1	..	1	8	2	1	.....	14	26	1,850 00
" " 3, Male	318	28	....	6	18	1	2	16	1	1	1	1	3	1	1	.....	8	16	1,000 00
" " 3, Female	780	85	....	17	500	4	17	wall	1	2	..	4	4	....	2	Steam	.....	.....	13,000 00
" " 4	364	28	....	6	24	1	5	wall	1	1	..	1	2	1	1	Smead	1	....	1,275 00
" " 5	354	30	....	6	18	2	2	10	1	....		1	2	1	1	.....	6	12	850 00
" " 6	326	30	....	6	24	1	5	wall	1	1	..	1	4	1	1	Smead	1	....	1,275 00
" " 7	484	32	....	8	18	1	5	7	1	....		1	2	1	1	1	5	8	1,600 00
" " 8	1,002	48	....	14	36	2	12	wall	1	1	..	2	4	1	1	Smead	1	...	4,000 00
" " 9	614	26	....	6	18	2	2	10	1	....		1	6	2	1	.....	6	14	750 00
" " 10	186	22	...	5	20	1	6	12	1	1	..	1	2	1	1	.....	4	8	600 00
" " 11	619	48	....	12	40	2	10	wall	1	1	..	2	10	2	1	Smead	1	....	3,800 00
" " 13	836	52	...	14	40	2	12	32	2	1	..	2	6	2	1	Smead	1	....	2,650 00
" " 14	150	7	....	2	6	1	2	6	1	1	..	1	2	1	1	.....	3	6	350 00
" " 15	478	40	....	10	29	2	3	wall	2	1	..	2	10	2	1	Smead	.....	.....	2,850 00
" " 16, Male	408	30	....	6	20	1	5	12	1	1	..	1	2	1	1	4	.....	.....	2,150 00
" " 16, Female	340	30	....	6	20	1	5	12	..	1	..	1	2	1	1	*e*	.....	.....	1,600 00
" " 17	316	24	....	6	20	1	5	15	1	1	..	1	2	1	1	Smead	.....	.....	1,500 60
" " 18	1,041	140	....	20	100	14	20	wall	4	3	..	6	8	....	1	Smead	.....	.....	10,645 00
" " 19	240	15	....	6	12	1	4	8	1	1	..	1	2	1	4	.....	3	6	625 00
" " 20	317	38	....	7	24	2	10	10	8	1	..	1	4	....	2	1	4	8	1,164 00
" " 21	60	12	....	4	24	1	5	wall	2	1	..	1	2	....	3	1	1	....	443 00
" " 1, Colored	158	10	....	3	6	1	3	4	1	1	....		1	.....	.....	.....	3	5	325 00
" " 2 "	112	4	....	2	6	1	3	7	1	1	....		1	.....	.....	.....	2	4	300 00
" " 3 "	142	14	....	4	8	1	3	6	1	1	....		1	.....	.....	.....	3	5	350 00
Totals, Annex	11,079	880	...	194	1081	52	156	193	37	26	1	36	95	23	29	5	73	120	$55,252 00

a Included in Male Grammar Department. *b* Included in Female Grammar Department. *c* Included in Male Primary Department.
d Included in Male Colored Department. *e* Included in Male Annex Department.

NOTE—At the request of the Secretary the inventory this year shows the number of seats (room for 1 pupil) instead of the number of desks as formerly.

INVENTORY OF FURNITURE, HEATING APPARATUS, ETC., IN THE SCHOOLS—RECAPITULATION.

SCHOOLS.	Number of Seats.	Rear Seats.	Settees.	Teachers' Desks.	Chairs.	Book Cases. Large.	Book Cases. Small.	Black Boards.	Clocks.	Organs.	Pianos.	Wardrobes.	Umbrella Stands.	Wash Stands.	Tables.	Furnaces.	Stoves.	Screens.	Estimated Valuation.
Baltimore City College....	939	56	78	16	130	19	1	16	13	1	1	2	.....	.....	8	4	.....	.....	$6,850 00
Eastern Fem. High School.	416	25	84	24	125	7	.....	22	3	.....	2	.....	.....	.....	12	4	2	2	5,340 00
Western Fem. High School.	798	90	159	18	115	16	7	wall	26	1	1	.....	.....	.....	9	Steam	.....	.....	9,750 00
Balto. Polytechnic Inst....	422	46	...	12	954	14	.....	wall	13	1	.....	.....	.....	.....	16	2	...	....	5,356 00
Col'd Man'l Training Sch'l.	225	12	...	11	67	8	6	25	1	1	..	1	.....	.....	1	....	15	22	900 00
Male Grammar.....	8,919	756	23	204	586	51	160	401	30	22	..	27	49	21	22	48	78	136	51,971 00
Female Grammar.....	9,482	676	92	177	585	45	154	358	24	17	4	29	76	20	22	10	77	147	12,081 00
English-German.....	7,967	477	2	137	304	21	99	185	13	12	..	19	46	13	15	14	46	68	26,711 00
Male Primary.....	15,039	1,165	34	275	909	50	223	538	38	37	1	43	163	37	39	37	147	253	63,875 00
Female Primary.....	14,119	1,094	68	263	819	48	217	565	38	37	..	39	121	37	37	.....	173	248	54,506 00
Colored.....	9,454	705	24	178	537	47	135	369	25	23	..	27	48	24	26	26	98	173	45,015 00
	68,817	5,102	564	1,315	5,131	326	1,002	2,509	222	152	9	187	503	152	207	145	636	1,049	$312,355 00
Annex Schools..	9,796	652	...	154	463	31	115	209	24	20	1	24	79	25	20	5	80	144	55,252 00
Totals.....	78,613	5,754	564	1,469	5,594	357	1,117	2,718	246	172	10	211	579	177	227	150	716	1,193	$367,607 00

PAPERS RELATING TO BALTIMORE CITY COLLEGE.

FACULTY.

FRANCIS A. SOPER, A.M., PRESIDENT,
Professor of Higher Mathematics.

CHARLES F. RADDATZ, VICE-PRESIDENT,
Professor of German and History.

A. L. MILLES, B.A.,
Professor of French and Latin.

POWHATAN CLARKE, M.D.,
Professor of Natural Sciences.

A. Z. HARTMAN, A.M.,
Professor of Latin and Greek.

J. N. HANK, A.M.,
Professor of Latin and Mental Philosophy.

JOSEPH H. ELLIOTT, SECRETARY OF FACULTY,
Professor of Book-keeping and Penmanship.

S. F. NORRIS,
Professor of Astronomy and Mathematics.

ALEXANDER HAMILTON,
Professor of English and Mathematics.

G. EMORY MORGAN, A.M.,
Professor of Latin and English.

PHILIP H. FRIESE,
Professor of Natural Sciences and English.

JULIUS G. MILLER,
Professor of Mathematics and Latin.

A. NEWTON EBAUGH, PH.B.,
Professor of History and Political Economy.

JOHN F. ARTHUR,
Professor of English and History.

B. WHEELER SWEANY,
Professor of Drawing.

WILBUR F. SMITH,
Professor of Mathematics and English.

CURRICULUM.

FIRST YEAR.

History of United States,
History of England,
Writing,
Composition,
Drawing,
Physics,
English Literature,
Latin,
Book-keeping,
Algebra,
Geometry.

SECOND YEAR.

Composition,
English Literature,
Book-keeping,
Physics,
Drawing,
Latin,
German,
Geometry,
History of Rome,
Mensuration,
Elocution,
Constitution of Maryland.

THIRD YEAR.

Composition and Elocution,
English Literature,
Drawing,
Latin,
Chemistry,
Review of Mathematics,
History of Greece and Eastern Nations,
German,
Greek (optional),
French,
Trigonometry and applications,
Rhetoric.

FOURTH YEAR.

English Literature and Essays,
Chemistry,
Latin,
Greek,
French,
Surveying and Navigation,
German,
Drawing,
Analytical Geometry,
Astronomy,
Civil Government,
Elocution.

FIFTH YEAR.

Latin,
Greek,
Calculus,
English Literature and Essays,
Mental Philosophy,
Political Economy,
French,
German,
Chemistry,
Astronomy,
Drawing,
Elocution.

RECITATIONS.

114th and 115th Terms.

RECITATIONS HEARD EACH WEEK BY THE RESPECTIVE PROFESSORS.

PROFESSOR SOPER—Calculus, 4 times; Analytical Geometry, 6 times; Preparation, 4 times 14

PROFESSOR RADDATZ—German, 21 times; English History, 2 times; Preparation, 1 time 24

PROFESSOR MILLES—Latin, 9 times; French, 15 times 24

PROFESSOR CLARKE—Natural Philosophy, 6 times; Chemistry, 18 times 24

PROFESSOR HARTMAN—Greek, 12 times; Latin, 12 times 24

PROFESSOR HANK—Latin, 20 times; Mental Philosophy, 2 times; Preparation, 2 times 24

PROFESSOR ELLIOTT—Book-keeping, 21 times; Writing, 1 time; Preparation, 3 times 25

PROFESSOR NORRIS—Trigonometry, 12 times; Astronomy, 3 times; Surveying and Navigation, 4 times; Review Mathematics, 4 times; Preparation, 1 time 24

PROFESSOR HAMILTON—Geometry, 18 times; Review Mathematics, 4 times; Algebra, 2 times; Preparation, 1 time 25

PROFESSOR MORGAN—Latin, 15 times; English Literature, 6 times; Composition, 1 time; Preparation, 2 times 24

PROFESSOR FRIESE—Composition, 8 times; Natural Philosophy, 12 times; History of United States, 3 times; Preparation, 1 time .. 24

PROFESSOR MILLER—Latin, 10 times; Algebra, 6 times; Composition, 2 times; Geometry, 4 times; Preparation, 3 times 25

PROFESSOR EBAUGH—History, 19 times; Political Economy, 2 times; Civil Government, 2 times; Preparation, 1 time 24

PROFESSOR ARTHUR—English Literature, 15 times; Rhetoric, 9 times 24

PROFESSOR SWEANY—Drawing, 24 times; Preparation, 1 time 25

PROFESSOR SMITH—History, 3 times; English Literature, 6 times; Writing, 5 times; Algebra, 4 times; Geometry, 2 times; Composition, 4 times, Preparation, 1 time 25

CLASS RECITATIONS.

Recitations Made Each Week by the Different Classes.

Fifth Year.—J.—Calculus, 4; French, 2; German, 2; Chemistry, 3; English, 3; Drawing, 1; Latin, 4; Mental Philosophy or Greek, 2; Astronomy, 1; Political Economy or Greek, 2—24.

Fourth Year.—I^1 and I^2.—Analytical Geometry, 3; French, 2; German, 2; Chemistry, 3; English, 3; Drawing, 1; Latin, 4; Greek, or Surveying and Navigation, 4; Astronomy, 1; Civil Government, 1—24.

Third Year.—H^1, H^2 and H^3.—French, 3; German, 2; Chemistry, 3; English and Rhetoric, 3; Drawing, 1; Greek or Review Mathematics, 4; Latin, 4; Trigonometry, 4; History of Greece and Eastern Nations, 1—25.

Second Year.—B^1, B^2 and B^3.—German, 3; Physics, 2; English Literature, 2; Drawing, 2; Latin, 4; Book-keeping, 3; Geometry, 4; Composition, 1; History of Rome and Constitution of Maryland, 2—23.

First Year.—A^1, A^2, A^3, A^4, A^5 and A^6.—Latin, 5; History of England, 2; Drawing, 2; Book-keeping, 2; Writing 1; Geometry, 2; Algebra, 2; English Literature, 2; Physics, 2; Composition, 2; History of United States, 1—23.

ROLL FOR THE YEAR 1898.

Number of students on roll December 31, 1897	670
Number admitted by promotion during 1898	310
Number admitted from private schools during 1898	19
Whole number on roll during 1898	999
Number withdrawn during 1898	301
Number graduated in June, 1898	34
Number re-entered during 1898	6
Number on roll December 31, 1898	664
Average attendance during 1898	595.2
Average number on roll during 1898	630
Percentage of attendance for the year	94.4
Number on roll June 30, 1898	545
Number of those who returned after summer vacation	405
Number of new students entered after September 6, 1898	329
Whole number on roll from September 6 to December 31, 1898	734
Number withdrawn from September 6 to December 31, 1898	70

GRADUATES.

Charles Edwin Adams,
Norman Boyer,
John Straith Briscoe,
John Howard Bucher,
William Jackins Buttner,
Harry Stephenson Byrne,
Thomas Reese Cornelius,
John Hall Dew,
Leyburn Grear Fishach,
John Thos. Ward Hammar,
Frank Porter Hatter,
John Walter Hoover,
Oscar Vincent McGill,
Solomon Mendels,
Elmer Hall Miller,
John Frederick Miller,
Walter Conrad Mylander,
George Edward Rehberger,
Charles Henry Saylor,
George William Seabold,
George Edgar Selby,
Henry August Singley,
Calvert Frederick Stein,
Henry Philip Straus,
Abraham Strauss,
Otto Albert Struth,
Frank Le Roy Templeman,
William Collings Thompson,
John Crouch Tolson,
Charles Cumming Tumbleson,
Charles Vavrina,
Thomas Bayard Williams,
Maynard Worley,
Frederick Zies.

Recipients of the Peabody Prizes.

OF THE FIRST GRADE—ONE HUNDRED DOLLARS EACH.

Walter Conrad Mylander, Solomon Mendels,
Otto Albert Struth.

OF THE SECOND GRADE—FIFTY DOLLARS EACH.

Charles Henry Saylor,
Henry August Singley,
Calvert Frederick Stein,
George William Seabold.

Papers Relating to Baltimore Polytechnic Institute.

FACULTY.

SESSION 1898–1899.

JOHN W. SAVILLE, LL.B., PRESIDENT,

Engineering.

RICHARD H. UHRBROCK, VICE-PRESIDENT,

Higher Mathematics.

WILLIAM DUGENT,

Instructor in Pattern-making and Wood-turning.

WILLIAM G. RICHARDSON,

Instructor in Chipping, Filing and Machine Construction.

WILLIAM H. HALL,

Instructor in Electricity, Chemistry, Physics and History.

*THOMAS G. FORD,

Instructor in Carpentry.

JOSEPH F. McBEE,

Instructor in Reading, Writing and Spelling.

J. WARD WILSON, M.D.,

Instructor in Anatomy, Physiology and Hygiene.

GEORGE M. GAITHER,

Instructor in Carpentry.

*WARREN S. SEIPP,

Instructor in Free Hand Drawing.

FREDERICK D. J. KAESSMANN,

Instructor in English and German.

WILLIAM A. JONES,

Instructor in Sheet Metal Work.

SAMUEL M. NORTH,

Instructor in French and Algebra.

WILLIAM S. BLAKE,

Instructor in Literature, English and Oratory.

FREDERICK W. WILD,

Instructor in Sheet Metal Work.

SAMUEL P. PLATT,

Instructor in Mechanical and Architectural Drawing.

WM. P. GUNDRY,

Instructor in Book-keeping and Arithmetic.

OLIVER BACHARACH,

Instructor.

JOHN H. DEVALIN,

Instructor in Forging.

JOHN E. BROADBELT, JR.,

Instructor in Grammar, Algebra and Arithmetic.

*Graduates of this Institute.

THE COURSE OF STUDY.

The course of study covers three years, and the school time of the student is about equally divided between mental and manual exercises. It is similar to the usual high school course, with the exception that the study of ancient languages is replaced by instruction in drawing and in the care and use of tools. One hour per day is given to drawing, one hour and a-half to shop work and two hours and a half to academic study.

The course of study embraces five parallel lines, as follows:

First—A course in Mathematics, including Algebra, Arithmetic, Book-keeping, Geometry, Mensuration and Trigonometry.

Second—A course in Science, including Chemistry, Geography, Physics, Physiology, Steam Engineering and Electricity.

Third—A course in the English and in the German Language and Literature, and in History.

Fourth—A course in Free-Hand and Mechanical Drawing and Designing.

Fifth—A course in Tool Instruction, including Carpentry, Wood-carving and Turning, Pattern-making, Moulding, Soldering, Brazing, Vise and Machine Shop Work, and the care and Management of Steam Engines and Boilers.

GRADUATES.

Andrews, Thomas Jefferson.
Bachrach, Alan Joseph.
Bauersfeld, Leo.
Bosworth, Wilbur McKew.
Dollenberg, Fredrick Derick, Jr.
Doyle, Romulus Griffith.
Flahart, John Howard.
Galloway, Henry.
Gantz, Charles Raymond.
Griffith, Samuel Thomas.
Hatch, Alfred Cummins.
Hubers, William Herman, Jr.
Ingle, Joseph Lowrie, Jr.
Longnecker, John Scott.
McGreevy, John Walter.
Mealy, Edward Harris.
Metcalf, William Charles.
Miller, John Floyd.
Nolan, William Eldred.
Pollard, Gurdon Tyler.
Poole, Walt Percy.
Rehberger, John Maurice.
Rife, John McCullough.
Ruse, Harry Rufus.
Schaun, Paul Edward.
Sirich, John Henry, Jr.
Smith, John.
Snyder, Herbet Turner.
Wilcox, George Creamer.

Recipient of Alumni Medal.

Thomas Jefferson Andrews.

Recipient of Saville Steam Engineering Medal.

Harry Rufus Ruse.

Recipient of Electrical Engineering Medal, Presented by Class of '93.

Leo Bauersfeld.

Recipient of Medal for Proficiency in German, Presented by Prof. F. D. J. Kaessmann.

Alfred Cummins Hatch.

Recipient of Medal for Proficiency in Mathematics, Presented by Class of '96.

Thomas Jefferson Andrews.

GRADUATES—Evening Classes.

Mechanical Drawing.

Bacon, Benjamin Langworth.
Gibbons, Peter Aloysius.
King, Hugh.
Kingsbury, Robert Martin.
Malambre, Guy.
Shutz, Frank Joseph.
Ulrich, Charles Joseph.
Wheeler, Leonard Elwood.
Wheeler, Ralph Egbert.
Zeller, Andrew Ferdinand.

Architectural Drawing.

O'Leary, John Thomas.
Reese, Clifton Hooper.
Wich, Gustav Adolph.

Free-hand Drawing.

Lollman, Edward.

Book-keeping.

Schnepfe, August William.
Schellenberger, Michael Killian.
Tyson, James Edwin.

Arithmetic.

Schmidt, James Harry.

Carpentry and Wood Turning.

Addison, Edward Shouley.
Schneider, William Sebastian.
Schwartz, Albert Joseph.
Stewart, Edward Welsh.

ROLL.

DAY CLASSES.

Number of students on roll December 31, 1898	554	
Number of students admitted during the year	356	
Total number in the Institute during the year		910
Number withdrawn during the year	373	
Number graduated	29	
		402
Number now on roll		508
Average enrollment during the year	484	
Percentage of attendance during the year	941	

NIGHT CLASSES.

Number on roll December 31, 1898	728	
Number admitted during the year	708	
Total number in the Institute during the year		1,436
Number withdrawn during the year	654	
Number graduated	22	
		676
Number now on roll		760
Total number now on roll in day and night classes		1,268

Papers Relating to the Eastern Female High School.

FACULTY.

WILLIAM F. WARDENBURG, PRINCIPAL,
Astronomy, Book-keeping, Trigonometry.

MARY C. GEDDES,
Geometry, Composition, Mental Philosophy.

LAURA V. DEVALIN,
English Literature, Composition, Mental Philosophy.

ELIZA E. NICOLAI,
Natural Philosophy, Composition, Astronomy.

M. MATILDA MULLIN,
Drawing.

LEONORA E. CARPENTER,
History, Composition.

SUE M. LOHRFINCK,
Elocution, Composition, Physiology.

MARY C. BASIL,
Composition, Algebra, Geometry.

KATE M. LEWIS,
Algebra, Composition, History.

THEODOCIA B. MAHON,
Algebra, Composition, Geometry.

MARGARET GARRETT,
Latin.

ANNA B. DIETRICHS,
German.

MARY McLEAN,
Composition, Latin, Literature.

J. HARRY DEEMS,
Music.

GRADUATES.

Annie M. Baldwin,
Lottie W. Barnes,
Helen Beck,
Catherine F. Bell,
Mary Caroline Bell,
Esther Gertrude Bell,
Mary Hermes Bollman,
Ella Blair Boone,
Mabel Brown,
Alberta Hughes Bump,
Beulah Marian Butler,
Margaret Clarke,
Genevieve Claypoole,
Mary A. Coath,
Roberta Read Cockrill,
Ethel Lee Cooke,
Laura Baker Cooper,
A. Ella Cranmer,
Mary Lillian Cushing,
Loretta Angela Dooley,
Leila T. Doolittle,
Florence May Ely,
Melissa Evans,
Winifred M. Gerting,
Ada Gilbert Gibson,
Nettie Estelle Gosnell,
Mary Grothaus,
K. Beatrice Hahn,
C. Blanche Hancock,
*Martha G. Hazell,
Mary Irene Hess,
Ruth N. Holmes,
Maud May Horn,
Mabel Junkins,
Gertrude Kegan,
M. Louise Keiner,
Katharine B. Krug,
Hattie M. MacKenzie,
Maud G. Mahorney,
Catherine G. McEldon,
Laura E. McLaughlin,
Sadie V. Mettee,
*Jennie C. Miller,
Noma G. Miller,
Helen R. Mullin,
Loretto D. Murphy,
Honora Nagle,
Alice M. Neighoff,
Emma C. Osenburg,
Imogene Owens,
Mary V. L. Page,
Ruth A. K. Rodbird,
Elizabeth E. Rullman,
Frances Schlesinger,
Mary Edna Simmons,
Louise O. Simmons,
Carrie Myrtle Simpson,
Lula Smith,
Roberta Lee Smyth,
Charlotte V. Soine,
Caroline Louise Stahl,
Eliza M. Struve,
Josephine Turnbull,
Katie V. Tyler,
Carrie Grace Unglaub,
Mary E. Wheeler,
Helen McCay Young.

*Miss Jennie Miller and Miss Martha Hazell stand respectively 7th and 11th in their class, but not having taken the full course of four years, are thereby excluded from receiving Peabody Medals.

Recipients of Peabody Medals.

FIRST GRADE.

Mary Hermes Bollman,
Mary Grothaus,
Beulah Marian Butler,
Lottie W. Barnes,
Winifred M. Gerting.

SECOND GRADE.

Mary Irene Hess,
Ada Gilbert Gibson,
Helen McCay Young,
Charlotte V. Soine,
Mary E. Wheeler,
Noma G. Miller,
Helen R. D. Mullin,
Emma C. Osenburg,
Katie Virginia Tyler,
Ella Blair Boone.

Additional Number Receiving Tickets to Peabody Lectures.

Louise O. Simonds,
Roberta Read Cockrill,
Josephine Turnbull,
Ruth N. Holmes,
Hattie M. MacKenzie,
Frances Schlesinger,
Carrie Grace Unglaub,
Maud May Horn,
Mabel Brown,
Mary Caroline Bell.

CLASS RECITATIONS

Recitations Made Each Week by Different Classes.

L, M.—Mental Philosophy, 3; Trigonometry, 3; History, 2; Elocution, 1; Drawing, 2; Music, 2; Composition. 1; Astronomy, 3; German, 3; Latin, 5—25.

H, I, K.—English Literature, 2; Elocution, 1; Algebra, 2: History, 2; Geometry, 3; Book-keeping, 2; Drawing, 2; Music, 2; Composition, 1: German, 3; Latin, 5—25.

E, F, G.—Algebra, 3; Composition, 2; Drawing, 2; Elocution, 1; Geometry, 3; German, 3; History, 2; Literature, 3; Natural Philosophy, 2; Vocal Music, 2; Latin, 2—25.

A, B, C, D.—Literature, 3; Elocution, 1; Algebra, 5; Natural Philosophy, 3; Drawing, 2; Music, 2; Composition, 2; History, 2; Physiology, 2; Geometry, 3—25.

ROLL.

Number of pupils on roll December 31, 1897	423
Number admitted by promotion during 1898	206
Number admitted from private schools during 1898	1
Number admitted by transfer during 1898	7
Total number in school during the year	637
Average enrollment	421
Average attendance (93 per cent.)	392
Number withdrawn during the year	97
Number transferred during the year	23
Number graduated	67
Number now on roll	450

Course of Study in the Female High School.

FIRST YEAR.

Algebra,
Composition,
Drawing,
Elocution,
Geometry,
History,
Literature,
Natural Philosophy,
Physiology,
Vocal Music.

SECOND YEAR.

Algebra,
Composition,
Drawing,
Elocution,
Geometry,
German,
History,
Latin,
Literature,
Natural Philosophy,
Vocal Music.

THIRD YEAR.

Algebra,
Book-keeping,
Composition,
Drawing,
Elocution,
Geometry,
German,
History,
Latin,
Literature,
Vocal Music.

FOURTH YEAR.

Astronomy,
Composition,
Drawing,
Elocution,
German,
History,
Latin,
Mental Philosophy,
Trigonometry,
Vocal Music.

Papers Relating to the Western Female High School.

FACULTY.

ANDREW S. KERR, Principal,
Latin.

PAMELA A. HARTMAN,
English Literature, Psychology, Composition.

SARA S. RICE,
Elocution, Literature, Composition.

JANE S. WILLIAMS,
Algebra, Astronomy, Composition.

EMMA COWMAN,
Natural Philosophy, Physiology, Composition.

HENRIETA C. ADAMS,
History, Composition.

LOUISA C. SAUMENIG,
Trigonometry, Geometry, Book-keeping.

ANNA P. TUDOR,
Latin, Geometry, Composition.

ANNIE O. SOLLERS,
Geometry, Natural Philosophy, Composition.

FRANCES RUTTER,
Geometry, Natural Philosophy, History, Composition.

IMOGEN GEORGE,
Literature, History, Composition.

ELIZABETH HELSBY,
Algebra, Drawing, Composition.

ADA M. SPENCER,
Literature, Algebra, Physiology, Composition.

ANNIE W. NICHOLSON,
Algebra, Physiology, Natural Philosophy, Composition.

THERESA M. DALLAM,
Geometry, Algebra, Literature, History, Natural Philosophy, Composition.

ELIZA J. DAVIS,
Drawing.

FRANCES A. CASPARI,
German.

JOHN G. WEHAGE,
Vocal Music.

GRADUATES.

Aaron, Elmira M.
Aaron, Mary E.
Adams, Ethel.
Agnew, M. Antoinette.
Angelmier, Mary E.
Ashbury, Lillie Ruth.
Barclay, Anna T.
Berry, Isabel,
Brady, Carlotta May.
Brannan, Myrtle F.
Brown, Bessie B.
Carey, Margaret M.
Clagett, Jessie A.
Cohen, Birdie R.
Cohen, Helen.
Conlon, Anastasia E.
Crogan, Annie Lucile.
Cross, Miriam E.
Day, Edna M.
Dunn, Ella Barton.
Eigelberner, Mabel I.
Figg, Georgia Mabel.
Fountain, I. Teressa.
Frank, Berdie.
French, Mary B.
German, Nettie R.
Gill, Bessie Vincent.
Goldsborough, R. T.
Graney, Elizabeth C.
Gutman, Florence.
Gwin, Bettie Long.
Hammond, Fannie E.
Hammond, Grace A.
Harman, Cornelia M.
Hoffman, Florence E.
Hollstein, Bessie.
Holthaus, Hattie E.
Hottes, Florenee.
Hynson, Florence V.
Johannes, Eleanore M.
Johnson, Beatrice,
Johnson, Bertha E.
Jones, Annie R.
Jording, Louise
Krager, Grace E.
Lucas, Elsa M.
Lucke, Julia E.
McConnor, Grace W.
Meany, Anna S.
Medders, Carrie MacK.
Miller, Isabelle.
Mitchell, Edith.
Mueller, Emma.
Nesbitt, Mary.
Peddicord, Mabelle L.
Ray, Eva.
Reed, Grace E.
Reid, Nina Lindsey.
Renwick, Isabelle T.
Rhodes, Mary Howard.
Rippelmeyer, Alice.
Robinson, Clara A.
Rolker, Lillie A.
Schaefer, Carlotta L.
Schneider, Paula M.
Schroeter, Bertha.
Smith, Maggie V.
Starkloff, Elsa T.
Strohm, Emelia A.
Uhlhorn, Ella
Voyce, Daisy Irene.
Wallace, Marie M.
Walworth, Bessie.
Watkins, R. May.
Weinberg, Miriam.
Whitby, Eva.
Whitman, Mabel R.
Wilson, Ida Eastman.
Wilson, Isabel La Coste.
Wolf, Elizabeth George.

Recipients of Peabody Medals.

FIRST GRADE.

Paula M. Schneider, Miriam Weinberg, Hattie E. Holthaus,
Elizabeth George Wolf, Clara A. Robinson.

SECOND GRADE.

Helen Cohen, A. Stephanie Meany, Edna M. Day.
Bertha Schroeter, Cornelia May Harman, I. Teressa Fountain.
Julia E. Lucke, Jessie Clagett,
Berdie Frank, Mabel I. Eigelberner,

Additional Number Receiving Tickets to Lectures at Peabody Institute.

Mary H. Rhodes, Bessie Vincent Gill, Isabelle Miller,
Carrie McKay Medders, Birdie R. Cohen, Eva Whitby.
R. T. Goldsborough, E. M. Johannes,
R. May Watkins, Bessie Walworth,

STATISTICS.

Promoted from grammar schools June, 1897	377
Failed to enter September, 1897	74
Admitted from grammar schools	303
Examined from private schools	9
Admitted from private schools	5
Returned after summer vacation	362
Re-entered	25
Admitted from grammar schools	303
Admitted from private schools	5
Admitted from transfer	31
On roll after organization in September	726
Average number on roll during year	643
Average number in attendance	582
Percentage of attendance	90

CHANGES IN THE NUMERICAL CONDITION OF THE CLASSES.

	4th Year.	3d Year.	2d Year.	1st Year	Total.
On roll December, 1897	85	83	194	308	670
On roll June, 1898	80	73	137	240	530
Graduated June, 1898	80	..	...	...	80
On roll September, 1898	68	81	218	359	726
On roll December, 1898	65	81	181	348	675

Amount of tuition fees collected from non-resident pupils..... $336

CLASS RECITATIONS.

Recitations Made Each Week by the Different Classes.

M[1] AND M[2] CLASSES.—Astronomy, 3; Composition, 1; Drawing, 2; Elocution, 1; German, 3; History, 2; Music, 2; Mental Philosophy, 3; Trigonometry, 3; Latin, 5.

L and K CLASSES.—Algebra, 2; Book-keeping, 2; Composition, 1; Drawing, 2; Elocution, 1; Geometry, 3; German, 3; History, 2; Literature, 2; Music, 2; Latin, 5.

I, H AND G CLASSES.—Algebra, 3; Composition, 1; Drawing, 2; Elocution, 1; Geometry, 3; German, 3; History, 2; Literature, 3; Physics, 3; Music, 2; Latin, 2.

F, E, D, C, B, A[1], A[2] AND A[3] CLASSES.—Algebra, 5; Composition, 2; Drawing, 2; Elocution, 1; History, 2; Literature, 3; Physics, 3; Physiology, 2; Music, 2; Geometry, 3.

COURSE OF STUDY

——IN THE——

FEMALE HIGH SCHOOL.

FIRST YEAR.

Algebra,
Composition,
Drawing,
Elocution,
History,
Geometry,
Literature,
Music,
Natural Philosophy,
Physiology.

SECOND YEAR.

Algebra,
Composition,
Drawing,
Elocution,
Geometry,
German,
History,
Latin,
Literature,
Music,
Natural Philosophy.

THIRD YEAR.

Algebra,
Book-keeping,
Composition,
Drawing,
Elocution,
Geometry,
German,
History,
Latin,
Literature,
Music.

FOURTH YEAR.

Astronomy,
Composition,
Drawing,
Elocution,
German,
History,
Latin,
Mental Philosophy,
Music,
Trigonometry.

Papers Relating to Colored High School.

FACULTY.

GEORGE LEWIS STALEY, PRINCIPAL,
Latin, Mental Philosophy, Moral Science.

MARY E. HUDGINS,
Astronomy, Grammar, Trigonometry, Latin.

NELLIE M. O'CONNOR,
Algebra, Book-keeping, Geometry.

SARAH E. SEAGER,
History, Physics.

LIZETTE W. REESE,
Composition, Rhetoric, Literature, Physiology.

R. BELLE BROOKS,
Elocution, Arithmetic, Grammar, Music.

BETTIE MAKIBBIN,
Drawing, Etymology.

GRADUATES.

Ash, Marcelina.
Combes, Cecil.
Fleet, Edward.
Hazleton, Annie.
Kerr, Florina.
Locks, Katie.
Owens, George.
Scott, Belle.
Wilson, Estelle.
Bradford, Beatrice.
De Leva, Annie.
Gray, William.
Johns, Charity.
Lane, Edwardie.
Morris, Clara.
Reid, Eulalia.
Thompson, Ada.
Woodhouse, John.

ROLL.

Number of pupils on roll December 31, 1897		161
Number of pupils admitted from public schools		48
Number of pupils admitted from private schools		
Number of pupils re-entered		1
Number of pupils transferred		1
Number of pupils admitted by permit		7
		218
Graduates	18	
Withdrawn	33	
		51
Now on roll		167

CLASS RECITATIONS.

Recitations Made Each Week By Different Classes.

Fourth Year.—Mental Philosophy, 2; Trigonometry, 2; History, 2; Literature, 2; Grammar, 2; Latin, 3; Elocution, 2; Drawing, 1; Music, 2; Algebra, 2; Composition, 1; Astronomy, 3; Moral Science, 1—25.

Third Year.—Natural Philosophy, 2; Literature, 2; Latin, 3; Rhetoric, 1; Elocution, 1; Algebra, 3; History, 2; Geomtry, 3; Drawing, 1; Music, 2; Composition, 1; Book-keeping, 2; Grammar, 2—25.

Second Year.—Algebra, 2; Arithmetic, 1; Composition, 1; Latin, 3; Drawing, 1; Geometry, 3; History, 3; Literature, 2; Natural Philosophy, 2; Music, 2; Etymology, 2; Grammar, 2; Elocution, 1—25.

First Year.—Etymology, 2; Literature, 2; Elecution, 1; Algebra, 2; Latin, 4; Arithmetic, 2; Physiology, 1; Natural Philosophy, 2; Music, 2; Composition, 1; History, 3; Grammar, 2; Drawing, 1—25.

COURSE OF STUDY

—IN THE—

COLORED HIGH SCHOOL.

FIRST YEAR.

Etymology,
Literature,
Elocution,
Algebra,
Arithmetic,
Physiology,
Natural Philosophy,
Drawing,
Music,
Composition,
History,
Latin,
Grammar.

SECOND YEAR.

Algebra,
Composition,
Latin,
History,
Music,
Arithmetic,
Drawing,
Geometry,
Literature,
Natural Philosophy,
Etymology,
Grammar,
Elocution.

THIRD YEAR.

Literature,
Rhetoric,
Algebra,
History,
Drawing,
Music,
Natural Philosophy,
Elocution,
Geometry,
Latin,
Composition,
Grammar,
Book-keeping.

FOURTH YEAR.

Mental Philosophy,
History,
Literature,
Grammar,
Latin,
Composition,
Moral Science,
Trigonometry,
Algebra,
Elocution,
Drawing,
Music,
Astronomy.

PAPERS RELATING TO COLORED POLYTECHNIC INSTITUTE.

FACULTY.

Principal,

WILLIAM R. RYAN,

DRAWING AND ENGINEERING.

First Assistant,

SAMUEL T. LESTER,

Instructor in

HIGHER MATHEMATICS AND ENGLISH.

WILLIAM M. MALOY, SECOND ASSISTANT,

SCIENCE AND ENGLISH.

HENRY DEUSSEN, THIRD ASSISTANT,

MATHEMATICS AND ENGLISH.

Instructor in Wood-working,

CHARLES J. P. SCHMIDT,

CARPENTER, PATTERN-MAKING AND WOOD-TURNING.

Instructor in Metal Department,

JOHN E. AULD,

FORGE SHOP AND RAILING WORK.

Instructor in Metal Working,

FRANK W. WATERMAN,

MACHINE SHOP AND SHEET METAL WORK.

THE COURSE OF STUDY—(General.)

The complete course of study covers three years, and the school time of the students is about equally divided between mental and manual exercises. One hour per day is given to drawing, two hours to shop work, and two and a-half hours to the usual academic studies.

The course of study embraces five parallel lines, as follows:

First—A course in English Language and Literature, Composition, United States Constitution and Civil Government, and Ancient and Modern History.

Second—A course in Science and Applied Mathematics, including Physics, Physiology, Mensuration, Book-keeping, Commercial Business and Engineering.

Third—A course in pure Mathematics, including Arithmetic, Algebra, Geometry and Trigonometry.

Fourth—A course in Free-hand, Architectural and Mechanical Drawing, Designing and Penmanship.

Fifth—A course of Tool Instruction, including Carpentry, Wood-carving, Wood-turning, Pattern-making, Moulding, Soldering, Brazing, Vise and Machine-shop Work, Care and Management of Steam Engines and Boilers, and Military Drill.

List of Graduates in 1898.

Charles M. Chesley,	Charles H. Jenkins,	Irwin S. Ridout,
Eugene Davis,	George V. Sottier,	William J. Thompson.

ROLL.

Number of pupils on roll December 31, 1897	120
Number of pupils admitted from public schools	11
Number of pupils admitted from private schools	6
Number of pupils in school during year	137
Number of pupils withdrawn during year	39
Number of pupils graduated	6
	45
Number of pupils now on roll	92
Average number on roll during year	98.74
Percentage of attendance	85.70

GRADES FOR PRIMARY SCHOOLS.

SEPTEMBER, 1895, AS AMENDED TO APRIL, 1896.

FIRST GRADE—FIRST YEAR.

READING—*First Half Year.*—Use objects or pictures, blackboard, slates, Fisher's card and reading chart. From the beginning lead the pupils to associate words with the things, qualities or actions of which they are the representatives. First present the object to their attention and then the word that names it. After a few simple words have been learned in this way, combine each object-word with other simple words to form sentences which the pupils are to be taught to read. Continue this exercise with a series of simple object-words. In all new sentences present repetitions of word-forms previously learned and introduce new words gradually. Teach writing from the first, beginning with small letters of the simplest forms, as wholes, and afterward combining the letters to form simple words. Give much repetition in new combinations of letters previously learned. Use the reading chart after the written forms of a few words have been thoroughly taught. Begin with script instead of printed words.

Second Half Year.—Swinton's Primer and First Reader. Supplementary reading to repeat word-forms in new sentences. Continue to practice writing words and sentences and reading them. In this and all subsequent reading work take special care to see that the thought to be expressed is in the mind of the pupil before requiring him to read aloud. Insist upon a distinct and audible utterance and correct pronunciation. Pupils must not be permitted to acquire the habit of drawling or reading disjunctively. Teach them to see whole phrases and to speak them as wholes. The articles *a*, *an* and *the*, and the unemphasized little words *in* and *to*, etc., should be pronounced as unemphasized prefixes. For example, *a float*, *a boat*, should be spoken as single words, like *afloat*, *about*, etc. Never allow the too common fault of hesitating in learning to read. Make the pupils familiar with the matter of each reading lesson by conversation and explanation, so as to lead them to read it at sight. To this end the new words of each lesson should be written on the blackboard and fully explained. The pupils should also be required to copy them into sentences before allowing them to read the lesson. Oral spelling from the reading lesson.

ARITHMETIC—*First Half Year.*—Teach numbers from one to twenty. *Second Half Year.*—Teach to one hundred. Develop the *idea* of number, as wholes; with objects, numeral frame, marks, etc. While

doing this do not at first permit the pupil to *count* unless the objects to be counted are actually present. Treat each number above 1 with all possible combinations of the preceding numbers to produce it by adding, and with its separations by subtracting them from it—

First. With objects, numeral frame, marks, etc., without figures.

Second. With objects and figures.

Third. Mentally with abstract numbers.

Fourth. With simple practical examples.

Train the pupils to recognize the number at sight without conscious effort at counting, as they recognize the words, *day*, *man*, etc. Encourage the children to talk, but require their answers to be full and complete sentences.

Miscellaneous examples for rapid solution by adding and subtracting.

Appleton's First Lessons in Arithmetic to be used in oral teaching in all the grades. Follow closely the methods of the author, intended to develop arithmetical knowledge.

Slate Work—*First Half Year.*—Addition, the result to be no greater than 20. *Second Half Year.*—No greater than 100. Teach coins from one cent to twenty, inclusive; pint; quart; inch.

In advanced classes of this grade the teacher is expected to carry the pupils as far as the condition of the class will warrant. Such a class, properly graded, should be able to accomplish the work of the first half year of the second grade.

Language.—Purpose: to accustom pupils to express what they know in correct forms of speech. Oral exercises from objects and pictures connected with the reading and observation lessons, including the lessons in numbers and whatever the ingenuity of the teacher may suggest. Use Hyde's or Sheldon's Language Lessons so far as applicable to First Grade.

Penmanship.—Begin with the thirteen small letters, combining them into short, easy words. Be careful that the copies set are in good writing. After the pupils are able to write fairly well, exercise them in copying easy sentences. Require them to read what they have written. The idea of form and symmetry is to be required at this point, rather than the making of nice lines. The copying of printed forms from books as an exercise must not be allowed.

Drawing.—One hour per week. The position of points, then of straight lines, with the names and shapes of the simplest geometric forms, and the drawing of objects based on these forms, also the bisection of lines.

Music.—New American Music Reader No. 1. Through page 12.

SECOND GRADE—SECOND YEAR.

Reading and Spelling.—Swinton's Second Reader. Supplementary reading. Exercises in articulation and pronunciation. Written and oral spelling from the reading lessons. A few short pieces of suitable

poetry carefully learned and frequently recited. Require the pupils to write the words before spelling them orally by letters. Accustom pupils in written spelling to recognize all the characters in the word-forms, such as the *apostrophe*, etc. Require them to memorize the alphabet as an acquisition for future use. Observe directions in previous grade.

ARITHMETIC.—Combinations and separations of numbers to one thousand.

Adding, subtracting and multiplying—

First. Without figures.

Second. With figures, using no amounts or minuends greater than one thousand or multipliers greater than nine. Roman numerals to C.

Coins continued. Pint, quart, gallon. Pint, quart, peck and bushel. Hour, day, week, month and year. Dozen. Inch, foot and yard. Ounce and pound.

SLATE WORK.—Write and read numbers containing six figures. Addition, subtraction and multiplication with not more than three figures as a multiplier. Simple practical problems. Teach well the multiplication table through 9x12. Illustrate the construction of the table with objects, the numeral frame, etc. Give oral drills in rapid combination of numbers.

LANGUAGE.—Work of first grade continued. Short stories told or read to the pupils and reproduced by them orally. Pupils to give expression to thoughts suggested by objects and pictures or by observation lessons. Use Hyde's or Sheldon's Language Lessons so far as applicable to First and Second Grades.

PENMANSHIP.—*First Half Year.*—Review the writing of the small letters and teach the writing of all the capitals and all the marks of punctuation. Give daily practice in writing words and sentences taught in the language and reading lessons. Give exercises in writing from dictation and transforming printed language into script. Accept no careless work.

Second Half Year.—Practice in movements of the arm, hand and fingers with the pen held correctly, using suitably ruled copy-books for such work—

First. Copying from the blackboard or from slips.

Second. Writing selections in script from the reading book.

Third. Words, phrases, sentences and short stories from dictation.

DRAWING.—One hour per week. Books with straight line designs are provided, additional forms taught, with the trisection of lines.

MUSIC.—New American Music Reader No. 1. Through page 20.

THIRD GRADE—THIRD YEAR.

READING.—Swinton's Third Reader. Exercises in articulation and pronunciation. Written and oral spelling selected from Swinton's Third Reader. A few appropriate selections of poetry carefully read, learned and frequently recited. Observe directions in previous grades.

ARITHMETIC.—The text-book in this grade is to be used for *reading* and *thinking* as well as for drill work.

Writing and reading integers to and including millions. Miscellaneous exercises in addition, substraction, multiplication and division of integers. In long division the divisor not to exceed four figures.

Multiplication table reviewed and continued through 12x12. Roman numerals to M, and ordinal numbers as needed in connection with the reading and other lessons.

Coins previously studied and paper currency. Second, minute, hour, day, week, month and year. Time of day by the clock. Units of dry and liquid measure previously studied, thoroughly reviewed. In this grade the ground rules—addition, substraction, multiplication and division—thoroughly reviewed: collateral practice with exercises for rapid execution—adding columns of figures, etc.

PENMANSHIP.—Practice in movement of the arm, hands and fingers with the pen held correctly. Use practice paper one hour a week. One writing-book, or its equivalent, completed each each half year. Copying from the blackboard. Writing selections and dictation exercises in blank books.

LANGUAGE.—Work of second grade continued with oral and written exercises: short stories read silently and then reproduced orally and in writing; stories written from pictures; letter writing begun. Statements, questions and commands. The pupils must be able to illustrate the proper use of each by original examples, both oral and written.

Correct use of names, persons, cities, streets, the days, months and seasons.

Correct use of the words *I*, *uncle*, *aunt*, *you*, *is*, *are*, *was*, *were*, *has* and *been*.

Correct use of the abbreviations *Mr.*, *Mrs.*, *St.* (street), *Av.* (avenue), *Co.* (county), and those of the names of the days and months.

How to write addresses, dates and initials. Use of the apostrophe in common constructions. Quotations, use of the comma with the names of persons addressed.

Good models illustrating points in capitalization and punctuation to be copied by the pupils.

Exercises on the pronunciation of words commonly mispronounced.

Daily systematic written exercises consisting of short letters, with correct heading, salutation, signature and superscription, reproduction of short stories (first oral, then written), brief descriptions of pets, games, familiar occupations, pictures and stories told and written from them and answers to questions in correct sentences.

Special attention to penmanship, spelling, capitalization and punctuation in every exercise.

GEOGRAPHY—*Second Half Year.*—Give conversational lessons on plants, animals, people of different countries and climates, traveling by land and water, etc. Teach the natural divisions of land and water. Cardinal points of the compass. Names of the hemispheres, continents, oceans and grand divisions. General idea of our own country, State and city. Make the study interesting to the pupils, and endeavor by all means to create in their minds clear conceptions of geographical terms. Use the lessons of the book as reading and

thinking lessons. All terms and definitions should be learned with accuracy after they are clearly understood. Use either Swinton's or Frye's Primary Geography.

Lessons to develop ideas of—

(1) *Color*—Red, orange, yellow, etc.
Form—Sphere, cylinder, cube, etc.
Place—On, above, under, before, etc.
Size—Large, small, great, little, etc.
Qualities of Objects—Rough, smooth, sweet, etc.
(2) *Lessons on the Human Body*—Parts, use and movement, etc.
(3) *Familiar Plants*—Flower, leaf, stem, root, etc.
Animals—Cat, dog, horse, cow, etc.
Things—Objects in the school-room, etc.

The lessons on this subject should be purely oral with conversational illustrations. One hour a week, at such times as may be most suitable.

DRAWING.—One hour per week. The circle and its parts, the ellipse and oval with flat copies and object lessons based upon the above forms.

MUSIC—New American Music Reader No. 1. Through page 33.

SEWING—*First Half Year.*—Practice correct position, thimble exercise, holding the needle, holding the work, moving and threading the needle, making a knot, using scissors. Stitching canvas, using chenile needle and split zephyr. Basting, running, back stitching, overcasting, hemming, seaming.

Second Half Year.—Instruction about implements and materials for sewing. Inch measure. Review practical work, using colored cotton and sewing needle.

In all the grades make a list of words that pupils most frequently mispronounce, and drill them in their correct pronunciation; also give frequent and thorough drill upon words containing the vowel sounds properly grouped and arranged.

Particular attention should be paid to addition in all the grades. See that pupils perceive readily the sum of integers without resorting to the counting process.

Principals are authorized and expected to promote to higher grades during the year such pupils as shall evince ability to pursue the studies of the higher grades.

In this course of study more attention should be given to language and reading than to abstract work; and it is expected that principals will see that their assistants understand and follow closely the directions given in the present schedule.

The perceptive faculties should be brought into prominent exercise, as this is the law of childhood and youth. The disposition to discover impels them to activity. Hence the teacher, to be successful with children, must accustom them *to do* and discover for themselves. Train the eye to see, the ear to hear, the hand to do, and through these the mind to think.

GRADES FOR GRAMMAR SCHOOLS.

[SEPTEMBER, 1886—AS AMENDED TO APRIL, 1896.]

FOURTH GRADE—FOURTH YEAR.

LANGUAGE.—Newell's Third Reader. At least five exercises of an hour each per week. Spell the words in the first half of Newell's Third Reader and those the pupils misspell in written exercises. Continued application of what has been taught in the preceding grades. The two parts of a statement. Use of nouns, proper and common. Plural and possessive forms of nouns. Words that describe and point out objects. Words that assert. Words that show *how*, *when* and *where*. Words used instead of names. Objective and possessive forms of pronouns. Use of *I*, *he*, *she*, etc., after *is* and *was*. Words that show relation. Oral and written reproductions, at least once a week, of short stories, and stories from pictures, descriptions of familiar objects, brief letters, special attention being given to their form. Dictation exercises. Short poems to be studied and memorized. Daily systematic written exercises. Special attention to spelling, penmanship, capitalization and punctuation in every written exercise. Exercises in the pronunciation of words commonly mispronounced. Supplementary reading. One writing-book, or its equivalent, completed each half year. Recitation of appropriate selections.

HISTORY—First half of Eggleston's First Book of American History.

ARITHMETIC.—Written and mental. Addition, subtraction, multiplication and division of United States money (no decimal divisors or multipliers). Denominations, *in common use*, of dry measure, long measure, liquid measure, and time, with examples involving their practical application. Common fractions to multiplication. Endeavor to make pupils quick and accurate in working examples in the simple rules.

GEOGRAPHY.—Elementary, New England States and North America. Draw, from memory, map of North America. Frequent drills upon the outline maps of the world.

DRAWING.—One hour per week. Review the work of the preceding years, more attention being given to accuracy of form and finish.

MUSIC.—New American Music Reader No. 2. Through page 28.

SEWING.—Develop the cotton plant from the sowing of the seed to the manufacture of cloth. History of the cotton gin. Names of the threads in all woven fabrics. Review work of preceding grade, using half-bleached cotton cloth, with red and blue cotton, the blue marking the improvement in the work. Basting, running, stitching, hemming, overcasting, overhanding.

SCIENCE.—Dulany's Health Primer. To be used as a supplementary reader.

FIFTH GRADE—FIFTH YEAR.

LANGUAGE.—Newell's Fourth Reader. At least five exercises of one hour each per week. Supplementary reading. Spell the words in the speller from page 15 to page 31, and those the pupils mispell in all written exercises. Continued review and application of the principles taught in the preceding grades. Principal uses of capital letters. Pronouns used as subjects of verbs. Adjectives—Uses of different forms of adjectives; special study of adjectives commonly misused. Verbs, transitive (active and passive forms) and intransitive. Adverbs—Give special attention to negatives. Use and position of modifiers. Use of the comma to separate words and phrases in the same construction. Distinction between adjective and adverb. Prepositions—Special study of prepositions commonly misused. Conjunctions and interjections. Simple and compound sentences. Choice selections to be studied and memorized. Dictation exercises. Correct use of paragraph. Composition—Weekly; description of familiar things and events; letters, the subject being assigned by the teacher, and compositions upon other subjects in which the pupil must give the results of his own observation. Exercises in the pronunciation of words commonly mispronounced. Daily systematic written exercises. Special attention to spelling, penmanship, paragraphing, capitalization and punctuation in every written exercise. One writing-book, or its equivalent, completed each half year. Recitation of appropriate selections.

HISTORY.—Second half of Eggleston's First Book of American History.

ARITHMETIC.—Written and mental. United States money. Common fractions and decimals. Continue the exercises involving the tables studied in the fourth grade. Explain at the blackboard how the common denominations of square measure are derived from those of long measure, and teach the denomination of square measure *in common use* with simple examples involving their practical application. Frequent practice in the four rules, especially addition.

GEOGRAPHY.—Elementary. Middle Atlantic States, United States, South America. Draw, from memory, maps of Maryland and South America. Frequent drills upon the outline maps of the world.

SCIENCE.—Dulany's Physiology. To be used as a supplementary reader.

DRAWING.—One hour per week. The simplest "working drawings" introduced, and more attention given to sketching leaves and fruit from nature, with the first steps in original design suggested.

MUSIC.—New American Music Reader No. 2. Pages 29–36, and Keys of G. & D.

SEWING.—Patching, stocking darning, resoling stockings, hemming gathers and half-back stitch gathers to bands, tucking, gathering, placket, band.

SIXTH GRADE—SIXTH YEAR.

LANGUAGE.—Newell's Fourth or Fifth Reader. History of Maryland. Supplementary reading. At least five exercises, one hour each, per week. Spell the words in the speller from page 31 to page 46, and those the pupils misspell in all written exercises. Review and continued application of the principles taught in the preceding grades. Nouns—Singular and plural forms, possessive forms, including compound possessive, and the ways of distinguishing their gender. Pronouns—Personal pronouns, gender, number and case forms; adjective pronouns. Verbs—Person and number forms of verbs; tense, present, past and future; uses of the auxiliaries *shall* and *will;* regular and irregular verbs; participles; principal parts of common verbs, and much practice in using the past tenses and past participles of such verbs in sentences; careful study of *shall* and *will*, *should* and *would*, *learn* and *teach*, *may* and *can*, *lie* and *lay*, and other words commonly misused. Dictation exercises. Careful study of choice selections, with especial reference to the thoughts expressed. Weekly exercises in composition upon topics similar to the ones suggested in the preceding grades. Exercises in the pronunciation of words commonly mispronounced. Special attention to spelling, penmanship, paragraphing, capitalization and punctuation in every written exercise. Recitation of appropriate selections or declamation. One writing-book, or its equivalent, completed each half year. Recitation of appropriate selection.

HISTORY.—Eggleston's History of the United States to Chapter 23.

ARITHMETIC.—Written and mental. Compound numbers. Explain at the blackboard and by cubes how the common denominations of cubic measure are derived from those of long measure. Teach the pupils to perform with ease and accuracy operations in the simple rules and fractions. Practical examples involving the rules taught.

ALGEBRA.—To page 46, Section 80.

GEOGRAPHY.—Higher. Southern States. Central and North Central States. Europe. Draw, from memory, maps of Maryland and Europe. Frequent drills upon the outline maps of the world.

SCIENCE. Dulany's Physiology. One lesson a week. Teach the portions relating to hygiene and the nature of narcotics and alcoholic stimulants.

DRAWING.—One hour per week. More attention is given to construction, and from these drawings the objects are made of paper or wood.

MUSIC.—Review previous keys, and teach keys of A and E.

SEWING.—Felling. Button-holes, loops and eyelets. Tear darning. French hem. Button-holes and buttons.

SEVENTH GRADE—SEVENTH YEAR.

LANGUAGE.—Newell's Fifth Reader and the History of Maryland. Spell the words in the speller from page 46 to 61, and those the pupils misspell in all written exercises. Review and continue to apply the principles taught in the preceding grades. Special study of the verb. Review what has been taught about verbs in the preceding grades, and study in addition their manner of asserting. The infinitive. Use of phrases. Independent and dependent clauses. Complex sentences. Relative pronouns—forms of *who*. Distinctive uses of *who*, *which* and *that*. Interrogative pronouns. Use of comma in explanatory, intermediate and transposed expressions. Quotations, direct and indirect. Use of quotation marks in divided quotations. Careful study of choice selections, with especial attention to the thought expressed. Compositions, weekly, on familiar topics, as in preceding grades. Analysis of simple, complex and compound sentences. Recitation of appropriate selections and declamation. Exercises in the pronunciation of words commonly mispronounced. Special study of letter-writing, giving particular attention to business letters, and to the different forms of heading, address, salutation, conclusion and superscription required for letters of various kinds. Business forms, including bills, receipts, advertisements, notices of public meetings, telegraphic dispatches, etc. Supplementary reading. Constitution and Bill of Rights of Maryland to be used as supplementary reading at least once in two weeks. One writing-book, or its equivalent, completed each half year. Making out bills. Recitation of appropriate selections. Declamation.

HISTORY.—Eggleston's History of the United States to Chapter 37, reviewing sixth grade.

ARITHMETIC.—Written and mental. Percentage, profit and loss, interest, ratio and proportion, discount and partnership. Practical business examples involving the rules which have been taught.

ALGEBRA.—To page 135.

GEOGRAPHY.—Rocky Mountain and Pacific States. Europe reviewed. Africa. Draw, from memory, maps of Maryland and Africa. Frequent drills upon the outline maps of the world.

SCIENCE.—Dulany's Physiology. One lesson a week.

DRAWING.—One hour per week. Parallel perspective is taught in addition to construction and surface decoration.

MUSIC.—Review previous keys and teach keys of F and B♭.

SEWING.—Gussets. Gores. Bias-cutting and piecing. Facing. Plating. French gathers. Overhand gathers to band. Hooks, eyes and loops. Inserting.

EIGHTH GRADE—EIGHTH YEAR.

LANGUAGE.—Newell's Sixth Reader and the History of Maryland. Supplementary reading. Constitution of the United States and the Declaration of Independence to be used as supplementary reading at least once in t wo weeks. Continue to review and apply the principles taught in the preceding grades. Thorough review of the grammatical principles taught in the fifth, sixth and seventh grades, and more extended work in connection with the careful study of sentences from standard writers. Study in particular—Nouns—Classes, number, gender, case, and leading construction in different sentences. Pronouns—Classes and declension of personal pronouns. Adjectives—Comparison and correct use. Verbs—Classes, mode, tense, and use of auxiliary verbs. Participles and infinitives. Offices of adverbs. Coordinate and subordinate conjunctions. Sentences—Kinds, structure, analysis and uses. Forms and uses of phrases and clauses. Exercises in the pronunciation of words commonly mispronounced. Careful study of choice selections of poetry and prose, with especial reference to the thought expressed. Compositions at least once a week upon topics similar to those suggested in the preceding grades. Letter-writing and business forms. Declamation and the recitation of appropriate selections. Exercises in writing to be connected with book-keeping and composition. Recitation of appropriate selections. Declamation.

HISTORY.—Complete Eggleston's History of the United States, reviewing the sixth and seventh grades.

ARITHMETIC.—Written and mental. Finish the book, giving particular attention to the subjects taught in the preceding grades, and the following: Commission and brokerage, involution, evolution, mensuration (in connection with this subject review square and cubic measure), single entry book-keeping.

ALGEBRA.—Teach through quadratic equations.

GEOMETRY—*Male Grammar School.*—Wentworth. Books I., II. and IV. to proposition XIV.

Female Grammar School.—Brooks. Books I., III. to proposition VII., IV. to theorem XV. Practical problems in geometrical construction, pages 93–102.

GEOGRAPHY.—Asia, Oceania and Maryland. Draw, from memory, maps of Maryland and Asia. Frequent drills upon the outline maps of the world.

SCIENCE.—First half year—Physics to acoustics. Second half year—Dulany-Martin's Human Body.

DRAWING.—One hour per week. Angular, perspective and geometric work added to the subjects previously taught.

MUSIC.—Review previous keys; teach keys of E*b* and A*b*, and pieces in one, two and three parts.

SEWING.—Ornamental stitching—Hem, herring-bone, feather, chain, Kensington outline, blanket, tapestry. Button-holes in cloth. Cloth darning.

GRADES IN GERMAN FOR THE ENGLISH-GERMAN SCHOOLS.

FIRST GRADE—FIRST YEAR.

SPEAKING.—The class-room language for both teachers and pupils should be German. Answers to questions should be required individually and in complete sentences. No time nor pains should be considered too great a sacrifice if thereby the child learns to speak in the language. Characterize your vowels, "Umlaute," *w*, and *s*.

READING.—"Deutsches Lesebuch," by W. H. Rosenstengel and Emil Dapprich. Book I.

Method based on phonetic principles. Use introductory part of book so far only as is absolutely necessary to give an idea of sound representation. Enter upon connected reading in the second part as soon as possible and revert to first part to give special drill on new letters as they occur. It is not necessary to take every word in the exercises. Connected pieces in the second part need not be taken in the order of the book, but can be selected according to purpose. The following pieces are recommended for the initiative: page 42, "Was grad ist;" page 44, "Ich liebe die Blumen;" page 48, "Wie die Dinge sind;" page 41, "Was ich kann." From these pieces, written on the board stanza by stanza, children can be called upon to find sentences or lines, then words, and finally sounds.

German reading advances more slowly in the beginning than does English reading, not because it is not logical or approachable, for in this it has an advantage over the English, but because of the longer words. The child forms the slow habit of sounding out a word letter for letter. This can be counteracted somewhat by printing and writing some of the more common words on cards or pieces of model paper and having them read after momentary exposure. If started at the beginning of the year with a new class the task of making these cards will not be onerous. As soon as children show that they are gaining a grasp on the reading, they should be required to read sentences silently, and recite them without recourse to the book. The prose lessons should first be thoroughly gone over as object lessons, as oral lessons. In these lessons the children should be trained to enunciate clearly. They must learn to speak at all hazards; without ability to speak they will never acquire the power to think in the language, and in this case, reading would be an idle accomplishment. Teachers will please read "Suggestions to Teachers," given at the beginning of the Normal Third Reader.

WRITING.—German vertical script should be practiced. The customary German slant script set vertically is all that is necessary. At first copies can be set on the board for copying; but copying should be

dispensed with or reduced to a minimum as soon as possible. Sentences from the reading lesson written by the teacher, read and sounded by the pupil, should be erased or covered by the teacher and then written from memory by the children. The copies can then be uncovered or rewritten for comparison. Copying does not employ the mind on a sufficiently high plane. Children should be trained to write at least one or two short prose pieces in their entirety from memory during the year.

LANGUAGE.—Language lessons in this grade should be confined to object lessons (or elementary science), and stories to be orally reproduced by the children both in answer to questions and in connected narrative. Teachers should practice on sketch drawings to illustrate their work. Of all the lessons in the primary school the object lesson offers the most fertile field. There is an ample collection of reading selections in the first reader that can first be taken by the teacher as a basis for object lessons, and can finally be taken as reading lessons. Written symbols for words used should also be given, and some of the object lessons or stories written as suggested under "writing." For want of material, stories may be found in the reader, pages 48, 59, 60, 68, 77, 87, 89, 92, 101, 105, 106, 107.

MEMORY GEMS.—To be memorized and sung: page 84, "Hopp;" page 100, "Fuchs;" page 53, "Wenn ich;" page 52, "Wettstreit;" page 63, "In der Hecke;" page 65, "Der Mond;" page 96, "Mailied;" page 96, "Blumenstrauss," or equivalents.

ARITHMETIC.—The German teacher should also assist the English teacher in the mental arithmetic which is to be taught in German.

MUSIC AND DRAWING.—The German teacher is either to take charge of or assist in the teaching of these subjects at the discretion of the principal.

SECOND GRADE—SECOND YEAR.

SPEAKING.—See first grade.

READING.—"Deutsches Lesebuch," by W. H. Rosenstengel and Emil Dapprich, Book I., to be finished up. See directions given to first grade German.

ORTHOGRAPHY.—This subject should be confined to dictation exercises written on the board by the teacher and gone over with the class before being dictated. These lessons can be selected from the reader. New words should be written on the board as they occur in the reading or talking lessons.

LANGUAGE.—See directions for first grade. The object lesson and the story should form the basis for language work. Frequent written resumés of the object lessons should be given. Teach recognition and capitalization of nouns.

MEMORIZING.—To be memorized and sung: page 46, "Komm lieber Mai;" page 64, "Sommervögelein;" page 72, "Vergissmeinnicht;" page

99, "Kätzchen;" page 103, "Weihnachtsbaum." First grade reviewed. To be memorized: page 53, "Knabe:" pages 54, 58, 62, 74, 84, or an equivalent.

PENMANSHIP, ARITHMETIC, MUSIC, DRAWING, } See first grade.

THIRD GRADE—THIRD YEAR.

SPEAKING.—See first grade.

READING.—"Deutsches Lesebuch," by W. H. Rosenstengel and Emil Dapprich, Book II., to page 73. New words not simply to be translated but to be discussed in German, written on the board and applied in sentences. See "Suggestions to Teachers," Normal Third Reader. See also directions to first grade in German.

ORTHOGRAPHY.—See second grade directions.

LANGUAGE.—Object lessons (or science) and stories told by the teacher and reproduced orally should form the main part of the language work. New words occurring in the same should be written on the board and studied in connection with the lesson that introduces them. Have at least one object lesson or story written out from memory during each month, but do not expect the children to write correctly words with which they have not become thoroughly familiarized, both as to symbol and meaning.

GRAMMAR.—Articles, nouns singular and plural number, capitalization. Consult E. Hähnel and R. Patzig, "Deutsche Sprachschule," Part I., and model your exercises according to the same. The following sub-sections refer to the grammatical portions of the book: 1-10; 20-26; 108-125; 126-139, all inclusive. Time permitting, the dictation exercises and orthographical exercises are also recommended to be taken from Hähnel and Patzig.

Translation exercises should be reduced to a minimum to give more time for object lessons, story telling and memory gems. They should be confined to free renditions of the gist of the reading lessons in both languages.

MEMORY GEMS.—To be memorized, recited, and sung: Volkslieder, numbers 1, 3, 4, 6, 8, 11, 12; and page 98, number 142; page 122, number 166, or an equivalent. To be memorized and recited: reading matter, numbers 7, 16, 36, 40, 51, 56, 80, or an equivalent.

PENMANSHIP.—Taught with all written exercises; no poor work to be accepted; German script vertically written. See directions to first grade.

ARITHMETIC, MUSIC, DRAWING, SEWING, } See first grade.

FOURTH GRADE—FOURTH YEAR.

SPEAKING.—See first grade.

READING AND ORTHOGRAPHY.—See directions to first and second grades as well as to other grades; also "Suggestions to Teachers" in the Normal Third Reader. Finish up "Deutsches Lesebuch," by Rosenstengel and Dapprich, Book II., pages 74 to the end and review. Children in this grade ought to be able to narrate in English as well as in German the substance of their German reading lesson, to explain and illustrate terms in their reading lesson by means of the German language, and to substitute synonyms given and explained for terms in the same. They should also be made conscious of metaphorical language (Bildlichkeit).

LANGUAGE.—The object lesson (or science lesson) should again offer the material for at least one composition a month. There should be two written reproduction exercises a month, and also one simple letter as often.

GRAMMAR.—Simple sentences containing one subject or more, and a predicate expressed by a noun, an adjective or a complete verb. Declension of nouns, articles and descriptive adjectives, and comparison of the latter. Exercises are recommended to be taken from or modeled according to Hähnel and Patzig, "Deutsche Sprachschule." Part II. The following sub-sections cover the grammatical work: 1-4; 13-16; 17-25; 35-37; 52-66; 81-115; 116-119; 129-149; 167-176; 179-190; 195-201; 207-209.

TRANSLATION.—The following, omitting all fine print, are to be translated into German and some of the written exercises to be retranslated into English: Frye's Primary Geography, Sections 4, 8, 13, 15, 17, 21, 22, 90 and 110-113, inclusive; Physiology Primer, pages 97-102, inclusive; history, Montgomery's Beginners' American History, Sections 123-134, inclusive; or Eccleston's First Book, Chapters 18 and 19. With physiology and history it will be well to narrate the subject matter in German for oral reproduction before giving the same for translation. New words and phrases should be written on the board and studied. Free translation of the reading lessons.

PENMANSHIP.—Substitute the English vertical script for the German script from the fourth to the eighth grade.

MEMORY GEMS.—To be memorized, recited and sung: Volkslieder, numbers 7 and 10; reading text, numbers 22, 63, 76, 104, 109 and 121. To be memorized and recited, numbers 25, 76, 83, 99 or 100, 117, 119, 139, 145, 146, 149, 154, 162 and 171, or an equivalent. Review preceding grades.

MUSIC,
DRAWING,
SEWING,
} See first grade.

FIFTH GRADE—FIFTH YEAR.

SPEAKING.—See directions to first grade.

READING.—"Deutsches Lesebuch," by Rosenstengel and Dapprich, Book III., the following numbers, inclusive: 1–12; 21–31; 39–47; 61–73; 86–89; 96–103, 110–120; 129–136. See directions given to fourth grade, and "Suggestions to Teachers" in the Normal Third Reader.

ORTHOGRAPHY.—Connected with all subjects. See directions to second grade.

LANGUAGE.—One letter per month at least. One composition per month developed with the class from original sources. Two written reproduction exercises per month.

GRAMMAR.—Adjective elements (attributes) possessive pronouns, numeral adjectives, verbal compliments (objects in the accusative, dative and genitive cases.

Exercises to be taken from or modeled according to Hähnel and Patzig, "Deutsche Sprachschule," Book III. The following sub-sections cover the grammatical ground: 2–17; 35–58; 115–129; 135–139; 141–151 190–218. Other sections if time permits.

TRANSLATION.—The following, omitting all fine print, are to be translated into German, and some of the written exercises to be retranslated into English; Frye's Primary Geography, Sections 23–26, inclusive; 30–56, inclusive, 86, 88 and 89; Dulany's Physiology, pages 33-44 inclusive; history, Montgomery's Beginners' Book, Sections 243-255, inclusive; or Eccleston's First Book, Chapters 29 and 30. About history and physiology see directions to fourth grade. Free translations of the reading lessons.

MEMORY GEMS.—To be memorized, recited, and sung: Volkslieder, numbers 1, 2, 5, 6 and 7. Those of other grades reviewed. To be memorized and recited; reading selections, numbers 1, 20, 38, 47, 61, 65, 78, 85 and 131, or equivalents. Review of other grades.

PENMANSHIP.—See fourth grade.

MUSIC, DRAWING, SEWING, } See first grade.

SIXTH GRADE—SIXTH YEAR.

SPEAKING.—See first grade.

READING.—"Deutsches Lesebuch," by Rosenstengel and Dapprich, Book III., the following numbers, inclusive: 12-20; 32-38; 48-60; 74-85; 90-95; 104-109; 121-128; 137-146. See directions to fourth grade.

ORTHOGRAPHY.—Taught with all subjects. Dictation exercises from the reader, or from Hähnel and Patzig, "Deutsche Sprachschule." See second grade.

GRAMMAR.—Prepositions, adverbial elements, conjugations, participles and declension of indefinite pronouns. Exercises to be taken from or modeled according to Hähnel and Patzig, "Deutsche Sprachschule," Book IV. The following sub-sections cover the grammatical ground: 1-2; 17-55; 100-129; 141-163.

COMPOSITION.—One original composition a month. One letter or note per month (See English work.) Two reproduction exercises per month. Three or four poems transposed during the year.

TRANSLATION.—The following, omitting all fine print, are to be translated into German, and some of the written exercises to be retranslated into English for comparison: Frye's Primary Geography, Sections 87, 91-94, inclusive; 115-117, inclusive; Dulany's Physiology, pages 87-99, inclusive; history, Montgomery's Leading Facts, Sections 102-108, inclusive; or Mowry's, Chapters X. and XI.; or Johnston's, Sections 89-110, inclusive; or Eccleston's, Chapters X. and XI. Concerning history and physiology see directions to fourth grade. Free translations of the reading lessons.

MEMORY GEMS.—To be recited, and also sung: Volkslieder, numbers 8, 10 and 11. Reading matter, number 41. Review of songs learned in preceding years. To be memorized and declaimed, numbers 39, 60, 67, 85, 86, 90, 102, or an equivalent. Review other grades.

PENMANSHIP—See fourth grade directions.

DRAWING, MUSIC, SEWING, } See first grade.

SEVENTH GRADE—SEVENTH YEAR.

SPEAKING.—See first grade.

READING.—"Deutsches Lesebuch," by Rosenstengel and Dapprich, Book IV. The following numbers are to be read inclusive: 1–6; 13–28; 45–102; 164-171; 180–193; 204-223. See directions to fourth grade. Begin to handle reading matter from a literary point of view.

ORTHOGRAPHY.—See directions to sixth grade.

GRAMMAR.—Syntax of simple, compound and complex sentences. Review of former grades.

Exercises to be taken from or modeled according to Hähnel and Patzig, "Deutsche Sprachschule," Book V. The following sub-sections cover the grammatical ground: 1–14; 31–34; 41-49; 78-119; all of which numbers are to be considered inclusive.

COMPOSITION.—One original composition monthly: one letter or note monthly; two reproduction exercises per month; four or five short poems transposed into prose during the year; written synopses of the reading lessons. See English grade work.

TRANSLATION.—The following, omitting all fine print, are to be translated into German, and some of the written exercises recast into

English: Frye's Complete Geography, Sections 32-54, inclusive, and 76-85, inclusive; Dulany's Physiology, pages 125-133, inclusive; history, Montgomery's Leading Facts, Sections 183-190, inclusive; or Mowyr's, Chapter 49; or Johnston's, Sections 245-262, inclusive; or Eccleston's, Chapters 30 and 31.

Concerning history and physiology see directions to fourth grade. Free translations of the reading lessons.

Memory Gems.—To be recited as well as sung: Volkslieder, numbers 4, 6, 8, 10 and 11. Review of songs learned in preceding grades. To be memorized for declaiming: reading selections, numbers 51, 74, 90, 106, 117, 211, 212 and 229. Equivalents may be substituted. Review of other grades.

Penmanship.—See fourth grade directions.

Music,
Drawing,
Sewing,
} See first grade.

EIGHTH GRADE—EIGHTH YEAR.

Speaking.—See first grade.

Reading—"Deutsches Lesebuch," by Rosenstengel and Dapprich, Book IV. The following numbers are to be read, inclusive: 7-12; 29-44; 103-163; 172-179; 194-203; 224-257. See directions to fourth grade. Reading matter should now be studied as literature. Give historical and biographical background. Study style, form and figures. Endeavor to rouse a love for the masterpieces of a rich literature.

Orthography.—Refer to sixth grade.

Grammar.—Analysis—substantive, adjective, and adverbial clauses, and general review. Exercises to be taken from or modeled according so Hähnel and Patzig, "Deutsche Sprachschule," Book VI. The following sub-sections cover the grammatical ground: 1-9; 62-68; 83-84; 94-97; 106-107; 113-120; 128; 137; 146 and 147; 149 and 150; 167 and 168; 180-183; 191-193; 197-200; 208-211; 222-223; 228-232; 256, numbers between semi colons inclusive.

Composition.—See seventh grade.

Translation.—The following, omitting all fine print, are to be translated into German and some of the written exercises recast into English: Frye's Complete Geography, Sections 66-74, inclusive; Martin's Human Body, pages 223-236 inclusive; history Montgomery's Leading Facts, Sections 223-235, inclusive; or Mowry's, Chapter 58, or Johnston's, Sections 384-405; or Eccleston's, Chapters 41 and 42. Relative to history and physiology see directions to fourth grade. Free translations of the reading lessons.

Memory Gems.—To be recited as well as sung: Volkslieder, numbers 2, 3, 5, 12. Review of songs learned in preceding grades. To be memorized and declaimed; reading selections, numbers 77, 147, 155, 167, 213. Equivalents may be substituted.

PENMANSHIP.—See fourth grade.

MUSIC,
DRAWING,
SEWING, } See first grade.

It is further recommended that much of the time-killing and barren grammatical drudgery can be dispensed with, to wit: writing of conjugations and declensions, reciting of abstractions and definitions, and dwelling on fine points, and that in their stead, where time can be gotten to the extent of from one hour to one and a-half hours per week, this time be devoted to the study of universal history as leading up to the better understanding of the history of our own country and of humanity. The profit is double—invaluable information and command of language. The medium of communication is oral language in its most attractive form to children. This means "Personal, face to face, 'elbow' instruction" (Dr. D. C. Gilman) with children.

This course should be brief and should consist of short biographies that typefy times. These sketches should be narrated to and exacted from the children by the teacher.

The following course is suggested:

FOURTH GRADE.—Preliminaries, one lesson; Persian History, Cyrus and Darius; Greek Mythology, very brief—the great gods only: the Heroes, Hercules, Theseus, Oedipus, Jason; the Trojan War, at some length; Lycurgus; Spartan Education; Olympian games; Solon; Pisistrates.

FIFTH GRADE.—The Persian War: Miltiades, Aristides, Themistocles, Xerxes, Mardonius, Leonidas, Pausanias; Alcibiades, Epaminondas, Philip, Demosthenes, Socrates, Plato, Aristotle, Herodotus, Phidias, Alexander.

SIXTH GRADE.—Roman history. Romulus, the seven kings (briefly): Brutus and Collatinus (Horatius, Cocles and Mucius Scaevola), Menenius Agrippa, Coriolanus Cincinnatus, Appius Claudius, Camillus Decius Mus, Fabius Maximus, Pyrrhus, Hannibal, The Scipios, the Gracchi, Jugurtha, Marius Sulla, Cinna Pompey, Spartacus, Crassus. Catilina, Cicero, Cæsar, Cæsar Augustus.

SEVENTH GRADE.—Mediæval history, including the Roman emperors, Tiberius Nero, Titus Marcus Aurelius and Constantine, The Great Migration, Alaric, Attila, Theodosius, Theodorich, Clovis, Justinian, Otto the Great, Mohammed, Charles Martel, Charlemagne, Hugh Capet Hengist and Horsa, St. Augustine, Alfred the Great, William the Conqueror, Henry IV. of Germany, King John of England, the Crusades, the Hundred Years' War.

EIGHTH GRADE.—For this grade modern history to include the present in convenient periods.

Where the introduction of universal history is found desirable a start can be made by teaching the fourth grade course throughout the school; add the fifth grade course next year for all classes that have had the fourth grade course and so on until the entire course is given.

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Nature Stories for Young Readers: Animal Life—D. C. Heath & Co.

First Grade.

Little Nature Studies (Revised Edition)—(Burt)—Vol. I.—Ginn & Co.
Stories for Children (Lane) American Book Company.

NOTE.—Group *A* for higher, *B* for middle and *C* for lower grades. For Riverside Series see list of supplementary reading on list of High Schools.

A.

Burke's Conciliation with the Colonies—No. 100, Riverside Lit. Series—Houghton Mifflin & Co.
Gods & Heroes—Francillon—Ginn & Co.
As You Like It—Shakespeare—Houghton, Mifflin & Co., Riverside Lit. Series, No. 93.
Tales of a Traveler—Irving—Am. Book Co.
Wright's Children's Stories of American Literature—Scribner—2 volumes.
How Plants Grow—Gray—For Teachers—Am. Book Co.
History of England—Thalheimer—Appleton.
Phillip's Historical Reader—England—Boston Supply Co., Part I.
Phillip's Historical Reader—England—Boston Supply Co., Part II.
Phillip's Historical Reader—England—Boston Supply Co., Part III.
Phillip's Historical Reader—England—Boston Supply Co., Part IV.

Abbot's Charles I.—Harper Bros.
Abbot's Mary Queen of Scots—Harper Bros.
Gilman's Magna Charta Stories—Lothrop & Co.
North's Heart of Oak Readers—D. C. Heath & Co., IV.
North's Heart of Oak Readers—D. C. Heath & Co., V.
North's Heart of Oak Readers—D. C. Heath & Co., VI.
Scudder's Washington, Riv. Series, No. 75—Houghton, Mifflin & Co.
Tales from Shakespeare—Lamb—Houghton, Mifflin & Co.
Swift's Gulliver's Voyage to Brobdingnag and Lilliput, Riv. Series, Nos. 89 and 90—Houghton, Mifflin & Co.
Edgeworth's Tales: Waste Not, Want Not, etc., Riv. Series, No. 44—Houghton, Mifflin & Co.
John Burrough's Sharp Eyes, etc., Riv. Series, No. 36—Houghton, Mifflin & Co.
The Spy—Cooper—University Pub. Co., No. 1 Standard Literature Series.
Rob Roy—Scott—University Pub. Co., No. 3 Standard Literature Series.
The Alhambra—Irving—University Pub. Co.
Evangeline—Longfellow—Houghton, Mifflin & Co., Riverside Lit. Series No. 1.

B.

John Fiske's War of Independence—Houghton, Mifflin & Co.
Hawthorne's True Stories from New England History—Houghton, Mifflin & Co.—Nos. 7, 8 and 9, Riv. Lit. Series.
Horseshoe Robinson (J. P. Kennedy)—University Pub. Co.—No. 10, Standard Lit. Series.
Essays from Irving's Sketch Book, Riverside Lit. Series No. 51—Houghton, Mifflin & Co.
The Story of the Greeks—Am. Book Co.
The Story of the Romans—Am. Book Co.
Shakespeare's Julius Cæsar, Riverside Lit. Series No. 67—Houghton, Mifflin & Co.
Song of Hiawatha, Nos. 13 and 14—Houghton, Mifflin & Co., two parts.
Glimpses of the Plant World—Ginn & Co.
Burton's Historical Reader (Indians of New England)—Morse Co.
Wright's Children's Stories of American Liturature—Scribner—2 volumes.
Heart of Oak Reader, No. 3—D. C. Heath & Co.
Brooks and Brook Basins—Frye—Ginn & Co.
Morris' Historical Tales From English, German, French, Roman and Greek History—Lippincott & Co.
Boy's King Arthur—Lanier—Scribner's.

C.

Hawthorne's Wonder Book—Houghton, Mifflin &. Co.
The Sir Roger De Coverley Papers—Houghton Mifflin & Co.
Little Nell—Educational Pub. Co.
Andrews' Each and All—Ginn & Co.
King of the Golden River—Ruskin—Maynard, Merrill & Co.
Hans Andersen's Fairy Tales—Second Series—Ginn & Co.
Ballads and Tales—Golden Rod Books—University Pub. Co.

The Sketch Book—Irving—University Pub. Co.
The Story of Our Continent (N. S. Shaler)—Ginn Co.
Stories of Industry (1 and 2)—Educational Pub. Co.
Leaves From Nature's Story Book (Nos. 1, 2 and 3, and Introduction)—Educational Pub. Co.
Andrews' Seven Little Sisters—Ginn & Co.
American History Stories (Vols. 1,2 and 3—Pratt)—Educational Pub. Co.
Cortes to Montezuma (Pratt School Library, American History)—Educational Pub. Co.
Pizarro—Educational Pub. Co.
Heart of Oak Reader, No. 2—D. C. Heath & Co.
Hazen's Readers (4th, 5th and 6th grades)—E. H. Butler.
Scott's The Talisman—Maynard, Merrill & Co.

SUPPLEMENTARY READING—ENGLISH-GERMAM SCHOOLS.

For Fourth Grade.

Die Ostereier und Rosa von Tannenburg, von Christoph v. Schmid—A. Weichert, Berlin.

For Fifth Grade.

Robinson Crusoe, by Campe—Thienemann, Stuttgart.

For Sixth Grade.

Homer's Iliad, by Ferdinand Schmidt—Oehmighe, Leipzig.
Cooper's Lederstrumpf, by Adam Stein—Oehmighe, Leipzig.
Anderson's Märchen (Lowe)—F. Volkmer, Leipzig.

For Seventh Grade.

Peter Schlemiehl's Wundersame Geschichte, by Chamisso—O. Hendel, Halle.
Reinecke Fuchs, by Ferdinand Schmidt—Oehmighe, Leipzig.
Greiechische Heroengeschichte, by Niebuhr, (F. A. Perthes).

For Eighth Grade.

Hauff's Märchen—Rieger, Freiburg.
Schiller's Wallenstein—Hendel, Halle.
Goethe's Hermann & Dorothea, by Colta, Stuttgart.
Andreas Hofer, by Otto Hoffman—Thienemann, Stuttgart.
Die Schönsten Sagen des klassischen Alterthums, by Schwab—Beitelsmann.
For all Grades—The Milwaukee Series of German Readers—Books, I., II., III., IV.—Rosenstengel & Dapprich.

REFERENCE BOOKS.

One Copy or Set to Each School.—Information Books—4 Volumes.

Foods and Beverages.
Everyday Occupations.
Man and Materials.
Modern Industries—Boston Supply Co.

Historical Tales—4 Volumes.

American.
German.
English.
French—J. B. Lippincott & Co.

Rolfe's Select English for School Reading—6 Volumes—Harper Bros.

Scott's Tales of Chivalry.
Tales from English History.
Tales from Scottish History.
Fairy Tales.
Tales from Shakespeare—Comedies.
Tales from Shakespeare—Tragedies.

TEACHERS' REFERENCE BOOKS.

Carpenter's Exercise in Rhetoric and Composition—MacMillan & Co.
Montgomery's United States History—Ginn & Co.
Knox-Heath's Elementary Lessons in English—Teachers' Edition. Part I. and II.—Ginn & Co.
Lippincott's Gazetteer of the World—Lippincott & Co.
Powell's How to Talk—Teachers' Edition—E. H. Butler & Co.
Prang's Manual for Books, 1, 6, 7, 8, 9 and 10—Prang & Co.
Fewsmith's Grammar—Christopher, Sower & Co.
Webster's International Dictionary—Merriam G. & C. Co., Indexed.
Johnson's Encyclopedia—D. Appleton & Co.
Worcester's Dictionary, New Academic—J. B. Lippincott & Co.
Guides for Science Teaching—D. C. Heath & Co.

Books for Primary Grades.

Arithmetic—Appleton's First Lesson—Am. Book Co.
Prince's by Grades 1, 2, 3—Ginn & Co.
Milne's Elementary—Am. Book Co.
Wentworth & Reed's First Step in Numbers—Pupils Edition—Ginn & Co.

BIBLES.

Bibles.
Testaments.

CHARTS.

McGuffey's Reading Chart, Manilla with Revolving Stand—Am. B. Co.
Butler's Reading Chart, with Frame and Easel—E. H. Butler & Co.
Appleton's Reading Chart, with Frame and Easel. Am. Book Co.
McGuffey's Reading Chart, on Rollers—Am. Book Co.
McGuffey's Reading Chart, with Portfolio—Am. Book Co.
Potter & Putnam's Vertical Chart—Potter & Putnam.
Monroe's Reading Charts—Full Series—E. H. Butler & Co.

DICTIONARIES.

Webster's National Pictorial—Octavo—Merriam G. & C. Co.
Webster's Primary—Am. Book Co.
Worcester's Comprehensive—Lippincott & Co.
Worcester's Academic—Lippincott & Co.

DRAWING BOOKS.

Prang's Complete Course Form Study and Drawing, Nos. 1 to 6, with Patterns—Prang's Educational Co.

GEOGRAPHY.

Natural Elementary—Am. B. Co.

HISTORY.

Eggleston's First Book—American—Am. B. Co.

MAPS.

Johnson's Outline Maps, with Spring Rollers.
Johnson's E. & W. Hemisphere.
Johnson's United States & Mexico.

MUSIC BOOKS AND CHARTS.

New American Music Reader, No. 1—Dulany Co.
Sunshine Song Book—Dulany Co.
Songs of the Nation—Silver, Burdette & Co.

READERS.

Cyr's Children's Primer.
Cyr's First Reader.
Cyr's Second Reader.
Cyr's Third Reader—Ginn & Co.

SPELLERS.

Stickney's Word by Word, Part I., Primary—Ginn & Co.

VERTICAL WRITING BOOKS.

The Normal Review System of Vertical Penmanship—S. B. Co.

Tracing Course, Two Numbers.
Regular Course, Nos. 1, 2 and 3.
Natural System of Vertical Writing—D. C. Heath & Co., Nos. 1, 2, 3, 4.
Graphic System—A. Lovell & Co.
Short Course, Nos. 1, 2, 3, 4, 5.
Vertical Round Hand Writing Books, Small Size of Primary Books, Nos. 1, 2, 3 and 4—Ginn & Co.

LIST FOR SUPPLEMENTARY READING.

Stepping Stones to Literature, Book I.—Sarah L. Arnold and Charles B. Gilbert—S. B & Co.
Our Little Books for Little Folks—Am. B. Co.
The Werner Primer—Werner Co.
Hazen's First Year Book—E. H. Butler & Co.
The Finch Primer—Ginn & Co.

The Werner Biographical Booklets—Werner & Co.

Story of George Washington.
Story of Daniel Webster.
Story of Abraham Lincoln.
Story of Ben Franklin.
The World and Its People. Book I., First Lessons No. 11, Book II., Glimpses of the World—Silver, Burdette & Co.
Legends of Red Children—M. L. Pratt—Werner & Co.
The First-Year Nature Reader—Beebe & Kingsley.
Old-Time Stories Retold by Children—E. Louise Smythe—Werner & Co.
Riverside Literature Series—Nos. 47 and 48, 49, 50 and 59, 107—H. M. & Co.
Grimm's German Household Tales. No. 107.
Fables and Folk Stories. 47 and 48—1 Vol.

Hans Andersen's Stories. 49 and 50—1 Vol.
Verse and Prose for Beginners.
Kingley's Water Babies—Stickney—Ginn & Co.
Burt's Little Nature Studies, Vols. I. and II.—Ginn & Co.

All-the-Year-Round, by Strong—Ginn & Co.—viz.:

Part 1, Autumn.
Part 2, Winter.
Part 3, Spring.

Eclectic School Reading—Am. Book Co.—viz.:

Fifty Famous Stories Retold. James Baldwin.
Stories of American Life and Adventure. Edward Eggleston.
Stories of Great Americans for Little Americans. Edward Eggleston.
Robinson Crusoe. Defoe.
Short Stories of Our Shy Neighbors. M. A. B. Kelly.
Plants and Their Children. W. S. Dana.
Stories of Colonial Children—Educational Pub. Co.
Æsop's Fables, Vols. I. and II.—Educational Pub. Co.
Nature's Stories for Youngest Readers—Educational Pub. Co.
Animals, Wild and Tame. Anna Chase Davis - Educational Pub. Co.
Some of Our Friends. L. D. Walsh—Educaticnal Pub. Co.
Stories of the United States for Youngest Readers. Anna Chase Davis—Educational Pub. Co.
Heart of Oak Reader, No. 1—D. C. Heath & Co.
Wright's Nature Reader, No. 1—D. C. Heath & Co.
Wright's Nature Reader, No. 2--D. C. Heath & Co.
Wright's Nature Reader, No. 3—D. C. Heath & Co.

TEACHERS' REFERENCE BOOK.

Brook's New Mental Arithmetic—Christopher, Sower Co.
Frye's Primary Geography—Ginn & Co.
Hyde's Lessons in English, Book II., and Advanced Lesson—D. C. Heath & Co.
Knox-Heath's Elementary Lessons in English—Ginn & Co.—Part I.
Knox-Heath's Elementary Lessons in English—Ginn & Co. —Part II.
Prang's Teacher's Manual—Prang Books 1 and 2, 3 and 4, 5 and 6.
Tarbell's Lessons in Language—Ginn & Co.—Part I.
Tarbell's Lessons in Language—Ginn & Co.—Part II.
Smart's Free Gymnastics - Am. Book Co.
Hopkin's Observation Lessons in Primary Schools—Lee & Shephard - 1 Vol.
Natural History Object Lessons—D. C. Heath & Co.
Newell's From Seed to Leaf—Ginn & Co.
Arnold's Waymark's for Teachers - Silver, Burdette & Co.
Sully's Hand-Book of Psychology - D. Appleton.
The American Revolution—John Fiske—Houghton, Mifflin & Co.
Hand-Book of Vertical Writing—Silver, Burdette & Co.
Manual of Vertical Writing—D. C. Heath & Co.
Cathcart's Literary Reader—American Edition—Am. Book Co.

List of Stationery for the Public Schools of Baltimore.

Plain Copy Books, 40 pages.
Spelling Blanks, 52 pages.
Blank Paper, ruled, 1st Grade—in pads of 100 each.
Blank Paper, ruled, 2d Grade—in pads of 100 each.
Blank Paper, ruled, 3d and 4th Grades—in pads of 100 each.
Blank Paper, ruled, Grammar Grades—in pads of 100 each.
Ink Wells, with Covers.
Ink Wells, without Covers.
Lead Pencils—Eagle Standard, Round—Nos. 1, 2, 2½, 3, 3½, 4 and 5.
Lead Pencils—Eagle Academic—regular or thin wood.
Lead Pencils—Eagle Fine Arts—Nos. 351 to 365—for High Schools.
Lead Pencils—A. W. Faber—Round.
Lead Pencils—Dixon High School—Round, Nos. 980 to 986.
Compass Pencils—Excelsior—for 8th Grade.
Compass Pencils—Eagle Compass and Divider No. 569—for 8th Grade.
Erasive Rubbers—Eagle, Bevel No. 1076.
Erasive Rubbers—Dixon No. 877.
Blackboard Rubbers, Coughlin No. 4.
Blackboard Rubbers, National No. 2.
Whiting Mills Cap Paper, Superfine, 12 Pounds.
Whiting Mills Letter Paper, Superfine, 10 Pounds.
Whiting Mills Note Paper, Superfine, 6 Pounds.
*Manilla Paper, 24 x 36, 40 Pounds—No. 1 Quality—for Drawing.
Model Paper—Tag Paper, 100 Pounds to ream.
Colored Papers—Assorted Colors, 4 x 4 Inches, in Packages of 100.
Envelopes—Buff and White—Small.
Envelopes—Buff and White—Large Size.
Steel Pens—Gillott's Genuine, No. 404.
Steel Pens—Gillott's Genuine, No. 303.
Steel Pens—Esterbrook's School, No. 444.
Steel Pens—Esterbrook's No. 700 Vertical, for Primary Grade.
Steel Pens—Esterbrook's No. A1, High School.
Steel Pens—Esterbrook's No. 135.
Steel Pens—Esterbrook's No. 333.
Steel Pens—Esterbrook's Nos. 556, 570, 571—Vertical—Grammar Grades.
Steel Pens—Miller Bros.' No. 6, Fine, No. 121, No. 105.
Steel Pens—Eagle, No. 170.
Steel Pens—Eagle, No. 410.

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*For ordinary calculating purposes this manilla paper should be ordered. You can then cut the sheets into 16 parts 6 x 9 each—which will be a convenient size for the purpose named.

Steel Pens—Spencerian, No. 1.
Steel Pens—Spencerian, No. 5.
Pen Holders—Medium—Tapering Handles, Eagle, No. 1637.
Pen Holders—Large—Tapering Handles, Eagle, No. 1539.
Pen Holders—Large—Straight Handles, Eagle, No. 1709.
Pen Holders—Medium—Straight Handles, Faber, No. 2440.
Pen Holders—Large—Straight Handles, Faber, No. 2560.
Chalk Crayons—Parmenter's—First Quality, no Grit.
Chalk Crayons—N. Y. Crayon Co.'s—White or Enameled—First Quality, no Grit.
Chalk Crayons—Colored, as Sample—First Quality, no Grit.
Carter's Mucilage, in Quart Bottles, with Small Bottle and Brush.
Ink, Maynard & Noyes', in Quart Bottles.
Ink, American Standard Ink Co.'s Fluid, in Quart Bottles.
Ink, Carter's Black Letter or Fluid, in Quart Bottles.
Ink, Duval's School Black, in Quart Bottles.
Rulers.
Principals' Gongs, B. & H., No. 2400.
Assistants' Gongs, B. & H., No. 2100.
Teachers' Ink Stands, with Rack.
Roll Books.
Knives for Sharpening Pencils, Eagle No. 2300.
Ink Vents.
Recess Bells.
LePage's Liquid Glue, with Brush.
Scissors.
Revolving Globes, 9 Inches in Diameter.
Hagerstown Mathematical Blocks.
Numeral Frame, Hand, 144 Balls.

EXTRACTS FROM STATUTES AND ORDINANCES

RELATING TO THE

PUBLIC SCHOOLS OF BALTIMORE CITY.

(Baltimore City Code, 1893.)

STATUTES.

776. The Mayor and City Council of Baltimore shall have full power and authority to establish in said city a system of free public school, which shall include a school or schools for manual or industrial training, under such ordinances, rules and regulations as they may deem fit and proper to enact and prescribe; they may delegate supervisory powers and control to a Board of Public School Commissioners; may prescribe rules for building school-houses and locating, establishing and closing schools, and may in general do every act that may be necessary or proper in the premises.

777. The Board of Commissioners of Public Schools of Baltimore City shall have power to examine, appoint and remove teachers, prescribe the qualifications, fix the salaries, subject to the approval of the Mayor and City Council, and select text-books for the schools of said city, provided such text-books shall contain nothing of a sectarian or partisan character. They shall annually make a report to the State Board of Education of the condition of the schools under their charge, to include a statement of expenditures, number of children taught, and such other statistical information as may be necessary to exhibit the operation of the schools. * * *

778. The Mayor and City Council of Baltimore shall have power and authority to make all ordinances for the protection of the school-houses and property, and to punish any person who may disturb the sessions of said public schools.

779. They are authorized and empowered to levy and collect upon the assessable property in said city, as other taxes are levied and collected, such amount of taxes as may be necessary to defray all the expenses incurred for educational purposes by them.

780. The Treasurer, on the warrant of the Comptroller, shall pay to the Mayor and City Council the proportion of the free school fund to which said city is entitled.

781. The Orphans' Court of said city shall order and direct the fund arising from intestates' estates that may be administered upon in said court, and which remains undistributed for want of legal representatives of the intestates to claim the same, to be paid to the Board of Commisssoners of Public Schools.

782. The court shall not make such order until they shall be satisfied that the intestate left no legal representative living at the time of his or her death, and they shall cause the administrator of such estate to give notice, by advertisement to be inserted for such periods of time and in newspapers published in such places as they may deem necessary, that upon default of the appearance of any legal representative of the intestate by a certain day to be fixed by the court and named in said advertisement, the estate of said intestate will be paid to the Commissioners of Public Schools.

783. They shall, upon passing an order directing such payment, require from the Treasurer of the Board of Commissioners of Public Schools, or any other officer who may be appointed by the said Board of Commissioners, or the Mayor and City Council of said city, to receive such funds, a receipt and release to the administrator for the same.

784. The release shall contain an obligation that the said funds shall be applied by the Board of Commissioners of Public Schools to the use and support of the public schools of the City of Baltimore, and shall be recorded and preserved in said court as other records are.

785. If the estate of an intestate shall be paid to the Board of Commissioners of Public Schools under this law, and any legal representatives of the intestate of no remoter degrees among collaterals than brothers' or sisters' children, shall at any time appear and prove him, her or themselves to be such legal representatives, the Board of Commissioners of Public Schools who receive such estate, or their successors, if the same shall be in their hands or shall have been applied to the use of the public schools, shall restore the same to such legal representatives out of the school fund under their direction.

Public General Laws of Maryland.

(ARTICLE XLIII.)

31. No teacher in any school shall receive into such school any person as a scholar until such person shall produce the certificate of some regular practicing physician that such an applicant for admission into the school has been duly vaccinated. Any teacher so offending shall, on conviction thereof, forfeit and pay a fine of ten dollars ($10) for each offence, and no public school trustee or Commissioner shall grant a permit to any child to enter any public school without such certificate under the same penalty.

(ARTICLE LXXVII.)

40. The nature of alcoholic drinks and narcotics, with special instruction as to their effects upon the human system, in connection with the several divisions of the subject of physiology and hygiene,

shall be included in the branches of study taught in the common schools, and shall be taught to and studied by all pupils whose capacity will admit of it in all departments of the public schools of the State, and in all educational institutions supported wholly or in part by money from the State. * * * The said text-books must be published, printed and sold in the State of Maryland.

Sections 59, 60 and 61 of Article 77, repealed and re enacted with amendments at Session of 1896, Chapter 135, and approved April 4, 1896.

59, as amended, provides for free books for all the schools in the State, and that the several Boards of School Commissioners shall furnish annually to the State Board of Education the title, the name of the publisher and the net price paid for each text-book purchased, which information shall be set forth in full in the annual report made by the State Board of Education.

61. The said several boards shall keep an account of all money expended under the provisions of this Act, and report the same in the annual financial accounts as required by law, and no money so received by them shall ever be used for any other purpose than for the purchase of school books, as provided by the two preceding sections.

SEC. 2. That the sum of one hundred and fifty thousand dollars ($150,000) be and the same is hereby appropriated to be paid by the State Treasurer, upon the warrant of the Comptroller, on the 1st day of August, 1896, and annually thereafter, and to be expended, or so much thereof as may be necessary, for the purchase of text-books, as provided in this Act.

SEC. 3. That the whole of said sum shall be apportioned by the Comptroller in the month of July of each and every year, as the State school tax is now apportioned, * * * to be paid to the treasurer of the boards in the same manner as the apportionment of the school tax is now paid.

ORDINANCES.

1. There shall be appointed by the two Branches of the City Council, in convention assembled, at the time and in the manner prescribed in Sections 2 and 5 hereof, twenty-two persons, to be called Commissioners of Public Schools, one Commissioner to be selected from each of the several wards of the city; and said Commissioners shall continue in office for the terms as prescribed in Sections 2 and 3 hereof; provided, that if any Commissioner shall remove from the ward from which he was appointed before the expiration of his term of office, then his place in the Board shall be declared vacant, and the Board may declare vacant the place of any Commissioner who shall absent himself from three successive stated meetings of the Board without showing satisfactory cause for his non-attendance after having been duly notified of the same; the Mayor shall always be *ex-officio* a member of said Board.

2. The Commissioners of Public Schools who shall be appointed in the month of February, 1877, shall be appointed for one, two, three

and four years, which several terms of service shall be determined by lot at their first meeting and immediately after their organization by the election of a President and Secretary, as provided by Section 5 hereof; the members severally appointed for the First, Second, Third and Fourth Wards shall draw lots for their terms of service, which terms shall be one, two, three and four years respectively, as fixed by the lot then drawn: and the several members for each succeeding four wards, the wards being taken in numerical order, shall determine their terms of service in the same manner as aforesaid.

3. In the month of February, in each succeeding year, the First and Second Branches of the City Council, in convention assembled, shall elect School Commissioners in place of those only whose terms of office shall at that time expire, and the Commissioners elected, as prescribed by this section, shall continue in office for four years.

4. The First and Second Branches of the City Council, in convention assembled, shall have power to expel a member of the Board of Commissioners of Public Schools, either for persistent neglect of duty or for conduct unbecoming a School Commissioner. Should any vacancy occur in the Board by removal, resignation, death or otherwise, the unexpired term shall be filled in the same manner as provided by the preceding sections hereof.

5. Said Commissioners shall meet within ten days after their election, and at their first meeting they shall proceed to the election of President from their own Board, to be chosen by a majority of the whole body; also a person to act as Secretary, who shall serve one year, unless sooner removed by the Board, and who shall have charge of the rooms, books, papers and documents of the Board, and shall perform such clerical duties as may be required of him by its members or committees. The Board shall assign the duties to be performed by him, and his salary shall be two thousand dollars per annum, payable monthly. If a vacancy should occur in the office of Secretary from any cause whatever, it shall be the duty of the Board to elect a person to fill said vacancy as soon as it can conveniently be done. In all cases a majority of the Commissioners shall constitute a quorum for the transaction of business.

5a. (Approved March 28, 1893). Authorizes the employment of a Clerk to the Secretary, whose duty it shall be to assist the Secretary and Assistant Secretary.

6. Whenever a vacancy or vacancies shall occur in the Board of Commissioners of Public Schools during the session of the City Council, it shall be the duty of the President of the Board to inform the Mayor of such vacancy or vacancies who shall communicate the same to the First and Second Branches of the City Council, who shall proceed in convention, according to their respective rules, to fill said vacancy or vacancies. If a vacancy or vacancies shall occur during the recess of the City Council, by death, resignation or otherwise, it shall be the duty of the Board to fill the same as soon as may be convenient, the person or persons so elected to serve until the next session of the City Council.

7. There shall be appointed by the Board a suitable person to be the Superintendent of Public Instruction for the City of Baltimore, who shall be a resident of the City of Baltimore, of literary and scientific acquirements, and of skill and experience in the art of teaching, and who shall serve for the term of four years, unless sooner removed by the Board. It shall be the duty of the Superintendent to devote his time and attention entirely to the general supervision of the public schools of the city, subject to such rules and regulations as the Board of School Commissioners may establish. It shall especially be the duty of the Superintendent to visit every school under the charge of the Board of Commissioners of Public Schools as often as once in each quarterly session, or four times during the academic year, to examine into its respective studies and to inquire into all matters relating to the government of the schools, such as its curriculum of studies, discipline and course of instruction pursued therein, the text-books that are used, the condition of the school-houses, and to make a monthly report of the matters thus specified to the Board of Commissioners of Public Schools

8. There shall be appointed by the said Board a suitable person to be the Assistant Superintendent of Public Schools, who shall be a resident of the City of Baltimore, of skill and experience in the art of teaching, and whose term of office shall be concurrent with that of the Superintendent.

9. It shall be the duty of such Assistant Superintendent of the Public Schools to aid the Superintendent in the supervision of the public schools of the city; he shall visit the primary schools as often as his duties will permit, and make a report of such visits to the Superintendent; he shall assist in the examination of the quarterly reports of teachers, in the preparation of the questions for the semi-annual examination of the classes of the primary and grammar schools, and be subject to such rules and regulations as the Board of Commissioners of Public Schools may establish.

10. In order to advance the interests of the schools committed to his charge the Superintendent, in conjunction with a committee of three members of the School Board, shall, in the forms prescribed by the Board, examine into and ascertain the qualifications of applicants for the situation of teachers, and re-examine, if necessary, any of the teachers employed in the schools under the charge of the Board; and in order further to promote the cause of sound education, and to elevate the character and qualifications of the teachers, the Superintendent shall, by all the means in his power, counsel and advise with the teachers in relation to their duties and proper classification of studies, the best methods of imparting instruction, and, in general, as to the proper discipline and management of the schools under their charge.

11. The salary of the Superintendent shall be fixed by the Board of Commissioners of the Public Schools, subject to the approval of the two Branches of the City Council; and he shall make annually a report in writing to the Mayor and City Council of all matters of interest or importance in connection with the schools; and shall also, when requested, furnish to the Board of Commissioners of Public Schools of the city a written statement showing the number of schools in the city,

the number of pupils under instruction and the teachers employed therein, with such additional information in respect to the matters above specified as may be deemed advisable and necessary.

12. The salary of the Assistant Superintendent of Public Instruction in Baltimore City shall be two thousand dollars ($2,000) per annum.

13. The Board of School Commissioners are authorized and directed to appoint annually, at the same time that the Secretary of the said Board is elected, a suitable person, a citizen of Baltimore, who shall be known as the Superintendent of Supplies.

14. It shall be his duty, under the instructions from the Board of School Commissioners, to supervise, take care of and have general control of all furniture, stoves, furnaces, fuel, repairs and other incidental supplies, which are now in possession of the Board, or which may be purchased by order of the Board; be responsible to the Board for their condition, and report from time to time as the Board may direct, and perform such other duties with reference thereto as may be required by the Board.

15. His salary shall be eighteen hundred dollars ($1,800) per annum, the amount to be taken out of the appropriation made to the said Board of School Commissioners for salaries.

16. The Register is authorized to receive through the Secretary of the Board, all monies from the teachers and all other funds due the School Board, and pay out of the funds standing in the treasury of the city to the credit of the public schools any orders that are provided for in the levy for school purposes, after having been examined by the Committee on Accounts and passed by the Board, signed by the President and countersigned by the Secretary of the Board of Commissioners of Public Schools.

17. The said Board of Commissioners of Public Schools shall have charge of the public schools in operation in the City of Baltimore, and of all such as may be in operation during their continuance in office, and it shall be their duty to employ teachers and determine their salaries, subject to the approval of the Mayor and City Council; to prescribe the courses of study and the books to be used; to make all such by-laws for their own government and all such rules and regulations for the management of the schools as they may deem expedient, and to modify and repeal the same at their pleasure; provided, that such by-laws, rules and regulations so made or modified be not inconsistent with the laws of the State or the ordinances of the city. And it shall further be the duty of said Board, at such time as other city officers are required to report, to report to the Mayor and City Council a statement of their transactions, with an account of their receipts and expenditures during the year last passed, and their resources for the year then commenced. The schedule of salaries of all officers, employees and teachers shall stand as now fixed. (The Code contains the schedule).

18. The Commissioners of Public Schools shall have charge of all the buildings used for school purposes, and they are hereby authorized to make all necessary repairs in the school-houses of the city, provided the same shall not exceed the sum of three hundred dollars ($300).

19. The said Board is authorized and directed to rent out, except for political purposes, for such compensation as to them may seem just and reasonable, the main halls in the Eastern and Western Female High School buildings, for public purposes, at such times and under such regulations as to them may appear right and proper: provided, the same shall not be rented so as to interfere with or interrupt the regular exercises of the schools.

20. The revenue derived therefrom, as provided in the preceding section, shall be accounted for by the said Board and paid over by them to the Register, who is directed to place the same to the credit of the public school fund.

21. The said Board shall not employ in building, repairing or improving, or in furnishing stationery or any other kind of supplies, any member of said Board; nor shall any member of said Board be interested, directly or indirectly, in any contract whatever for the use of the public schools.

22. The Board of Commissioners of Public Schools shall advertise for proposals in the purchase of all supplies for said schools to the amount of *fifty dollars and over, and said proposals shall be opened in the presence of the City Comptroller, the City Register and a Committee of said Board, who together shall constitute a Board to award all contracts, except those for musical instruments, which shall be awarded as follows: The said board of Commissioners of Public Schools, or its Committee on Music, shall select not less than three responsible and reputable manufacturers of the class of instruments required, and shall designate by proper specifications the character and style of the instrument to be furnished, and shall receive bids from those selected, which shall be opened before the above Board of Award, and the said Board of Award shall award the contract, in its discretion, to the lowest or next to the lowest bidder, for such a period as it may think proper, not to exceed five years.

23. In awarding all other contracts, the Committee of the Board of Commissioners of Public Schools shall have one vote, the Comptroller one vote and the Register one vote; but in awarding contracts for musical instruments each member of the Committee on Music shall have one vote, the Comptroller one vote and the Register one vote.

24. The salaries of the Superintendent, Assistant Superintendent and Secretary of the Board, and of the teachers and all other persons permanently employed by the Commissioners of Public Schools, shall be paid monthly, on the last day of each month, by the City Register; and he is hereby authorized, in case of any deficiency in the collection of the school fund, or in anticipation of the levy for the same, to advance, from time to time, to said fund such sums as shall be required for the payment of said salaries at the time when they shall be due.

25. There shall be no charge for tuition, or for the use of books and stationery in any of the public schools, but it shall be the duty of the Commissioners to furnish, free of all cost, to the pupils and their

*By ordinance approved April 18, 1894, this amount was made "not in excess of two hundred dollars."

parents all the necessary tuition and the use of books and stationery for the several schools, and in general whatever fuel or other supplies the schools may require—the same to be paid for from the public school fund.

26. The public schools of Baltimore are designed exclusively for the education of those pupils whose parents, or in the case of orphans whose guardians are citizens of Baltimore, or residents of Baltimore with a *bona-fide* intention to become citizens.

27. The Board of Commissioners of Public Schools are hereby directed, before admitting the children of non-resident parents or guardians into the public schools of the City of Baltimore, to charge such parents or guardians the following amounts, viz.: For admission to the Baltimore City College, per capita, twelve dollars and fifty cents per quarter; for admission to the Female High Schools, per capita, eight dollars per quarter; for admission to grammar schools, per capita, four dollars per quarter; for admission to primary schools, per capita, three dollars per quarter—the said amount to be paid invariably in advance, and to be paid by the School Commissioners to the Register of the City for account of the school fund; provided, the Register of the city for account of the school fund; provided, however, that nothing herein contained shall be so construed as to prevent the free admission into said schools of the children of registered voters of the city who are employed by the city in or about Druid Hill Park or the water works there situate, and who reside beyond the city limits.

28. The Commissioners of Public Schools shall not admit any book or books into use in the public schools, or discontinue the use of the same after having been admitted, unless said admission or discontinuance be approved by a vote of a majority of entire Board in session assembled at a regular meeting of said Board.

29. The said Commissioners of Public Schools are hereby authorized to receive all devises, bequests and donations which may be made for the benefit of said public schools, and all devises, bequests and donations received by said Commissioners, by virtue either of this section or of any Act or Acts of the General Assembly of Maryland, shall be paid over by them to the Register of the city, who shall place the same to the credit of the school fund; and if any condition or conditions be prescribed in any such devise, bequest or donation, the same shall be applied under the direction of said Commissioners, with the sanction of the Mayor and City Council, agreeably to the intention of the testator or donor; and if no condition be prescribed in any such devise, bequest or donation, it shall not be lawful for said Commissioners to draw all or any part of the amount thereof out of the city treasury during the year in which it was received, unless the collections from the resources and levy of the school fund for said year should fall short of the estimated expenditures forming the basis of said levy, or unless it shall have been already allowed in the estimated resources of the fund for said year; otherwise the same shall be included in the estimates of the ensuing year.

30. All funds which shall be paid to or received by the City Register, or in any other way, or through any other person or persons,

passed over and transferred to the Mayor and City Council of Baltimore, pursuant to the provisions of Sections 781 and 784 of Article 4 of the Code of Public Local Laws, title "City of Baltimore," sub-title "Intestates' Estates," shall be held subject to the order of the Board of Commissioners of Public Schools of the City of Baltimore, in like manner as the funds derived from taxation for said purposes are held; and such funds as may be thus received are declared to be a separate and distinct revenue, to be applied to the use and support of the public schools, in addition to the annual tax levied and the annual appropriation made for that purpose.

31. It shall be the duty of the City Register to notify and inform the Board of Commissioners of Public Schools, by a communication in writing, whenever any funds arising from the aforesaid source shall be hereafter received by him, and the amount of the same.

32. Whenever said Commissioners of Public Schools shall intend to apply any portion or all of the aforesaid funds hereafter received from intestate estates, the warrant or order drawn for said funds, or any portion thereof, shall show upon its face that it is drawn upon said funds; and it shall be the duty of the City Comptroller and the City Register to keep a separate account of all receipts and disbursements for said special and specific fund.

33. The Mayor is authorized, upon the presentation to him of satisfactory evidence of the existence of any just and valid claim on the part of the corporation, on account of the school fund, against a certain estate, and which claim it is, in his judgment, judicious to prosecute, to employ for that purpose the services of one or more agents, and to agree with such agent or agents for such compensation to him or them as he may deem fair and reasonable; provided, the said compensation shall be entirely contingent upon the recovery of the money.

34. All assessments for paving or repaving in front of any of the public schools or lots of ground attached thereto, and also all assessments of benefits for opening or widening any street or streets, so far as the public schools may be interested, shall be paid by the Register out of any unappropriated money in the treasury.

35. It shall not be lawful for said Board of Commissioners of Public Schools to exceed in their expenditures the amount annually appropriated therefor by the City Council; and it shall be their duty to apply the same exclusively to the several purposes, and, as far as practicable, in the proportion specified in the statement of estimated expenses, on which said City Council shall have based the school fund levy for the year.

36. Whenever any of the pupils of Baltimore City College shall have satisfactorily completed the prescribed term and course of instruction the Commissioners of Public Schools shall have the power to confer on them testimonials in form as follows, viz.: This certificate is given to ——— ———, a pupil of the Baltimore City College, in testimony that he has pursued and satisfactorily completed the studies of the ——— course of ——— years; and said testimonials shall be signed by

the President of the Board, by the Mayor of the city, with the seal of the city attached, by the Committee on the Baltimore City College, and by the Principal, Vice-Principal and Professors of said College.

37. Said Commissioners of Public Schools are authorized to cause said testimonials to be engraved on copper or lithographed, with a suitable vignette, the expenses necessarily connected with the preparation of said testimonials to be paid from the school fund; provided, that no Commissioner or teacher shall ever charge or receive any fee or compensation for so signing said testimonials.

38. Said Commissioners of Public Schools shall have power to confer testimonials on pupils of the Eastern and Western Female High Schools in conformity with the requisitions and provisions of the preceding two sections.

39. Whenever any pupil shall leave any of the high schools without having completed the prescribed term and course of instruction, then, and in such cases, said Commissioners shall have power to confer such testimonials on said pupils as said Commissioners may deem to be proper and appropriate to the occasion.

40. It is hereby made the duty of the Board of Commissioners of Public Schools of the City of Baltimore to organize separate schools for colored children (this was done in 1867), and to establish as many schools for the education of colored children of Baltimore City as may, in the judgment of said Board, be necessary.

41. The schools to be established in accordance with the provisions of this ordinance shall be subject to such rules and regulations as may be prescribed by the said Board in its discretion.

43. The Board of School Commissioners are authorized and directed in all colored schools to be hereafter established, and in all colored schools in any territory hereafter annexed to Baltimore City, to appoint teachers of the colored race as instructors in such public schools set apart for colored youths; provided, that they be shown, by examination or such other test as is applied to white teachers, to possess the necessary moral and intellectual qualifications therefor.

44. It shall be the duty of the Superintendent of Public Schools to hold public examinations, to which all colored applicants for teachers' positions may and shall be admitted.

45. All such applicants who pass a satisfactory examination shall be certified by the Superintendent of Public Schools to the Board of School Commissioners, and said Board of School Commissioners shall appoint the persons so certified to positions as teachers in all colored schools hereafter established and set apart for the colored race, and also in all such schools in any territory hereafter annexed to Baltimore City.

46. The schools hereafter established for colored children shall be supplied with the colored applicants so certified to the extent of the number applying before teachers of any other race shall be employed

in such schools; provided, however, that in no case shall teachers of the white race be employed in any school in which colored teachers are employed.

Ordinance No. 55, of 1895-96, approved April 10, 1896, provides, "That on and after the beginning of the regular school term in 1896 in all the colored public schools of Baltimore City * * * where white teachers are now, or may be hereafter employed, a gradual system of elimination of such teachers be instituted.

"And that whenever a vacancy occurs in any of said white faculties a white teacher shall be appointed to fill such vacancy temporarily only, and as soon as the vacancies thus temporarily filled shall be sufficient to supply positions for a whole white faculty then teaching in any colored school, said faculty shall be distributed among the other colored schools and their places filled by a whole faculty of colored teachers."

47. The salaries paid to such colored teachers shall be equal to those now paid to white teachers for simular service in the colored schools.

48. Whenever any of the pupils of the colored schools have satisfactorily completed the term and course of instruction prescribed for the pupils of the Colored High School, the Commissioners of Public Schools shall have power to confer upon them testimonials in conformity with the requisitions and provisions of this article relating to the conferring of testimonials upon pupils of the Baltimore City College, and the Eastern and Western Female High Schools.

49. There shall be established at the Baltimore City College, and at each of the two Female High Schools, a library for their use, without charge, under such regulations as may be adopted by the Board of Commissioners of Public Schools.

50. The selection of the books, which shall be only of an instructive and moral character, shall be made by the said Commissioners, or a committee appointed by them for the purpose, and no book deemed by them to be injurious to the morals of the pupils, or of a sectarian character, whether obtained by purchase or donation, shall be admitted in said libraries; and all books purchased under any future ordinance or resolution of the City Council, or otherwise, for this purpose, shall be subject to the restrictions herein contained.

51. The Commissioners of Public Schools of the City of Baltimore are hereby authorized to accept and receive the premiums given by the Trustees of the Peabody Institute to the Baltimore City College and the Female High Schools, as specified in Mr. Peabody's letter to his trustees, and to have the same distributed from time to time in such manner as they shall deem most conducive to the benefit of the schools and the objects of the donor.

52. The Board of Commissioners of Public Schools of Baltimore City are authorized and directed to establish in the City of Baltimore, in some convenient locality, as near the centre of the city as possible, a school for manual training, under such name or title as said Board shall select; said school shall be open to the children of the citizens and *bona-*

fide residents of the City of Baltimore, and the admission to said school shall be regulated by the law now existing for the admission of pupils to the public schools of the City of Baltimore, except in so far as changed by this ordinance; the age and qualifications for admission to said school shall be fixed and prescribed by the said School Board; provided, that the fee for the use of tools and materials for pupils who are the children of residents or citizens of Baltimore shall not exceed one dollar each per scholastic quarter; pupils from other places may be admitted to said school upon such terms and conditions and upon payment of such fees as said Board shall prescribe.

52a to 52e. An ordinance nearly identical with the above (Section 52), providing for a Manual Training School for Colored Children, was approved February 16, 1892.

57 to 60. It shall be the duty of all physicians who may be in attendance in any family whose child or children may be attending any of the public schools of this city, which family may have a case or cases of scarlet fever, diphtheria, measles, smallpox, chickenpox, whooping cough, or any other contagious disease, to give a certificate of the same to the parents or parent of the child or children so diseased as soon as the disease is developed; and it shall be the duty of the parents or parent, as soon as the physician certifies that contagious disease exists in his, her or their house, to notify the principal of the school attended by his, her or their children within twenty-four hours. That if there be no physician attending in cases of disease mentioned in this ordinance, it shall be the duty of the parents or parent to report the disease to the principal of the school attended by his, her or their child or children within twenty-four hours from the time the disease is known to be contagious. That if any parent or physician shall notify any public school teacher of the city that any contagious disease exists in any family whose child or children are attending any of the public schools of this city, then it shall be the duty of the principal of the school to exclude the child or children of said family from the school until the attending physician certifies that all danger from contagion has passed. That if any teacher or teachers reside, board or lodge in any house where a child or children in such house is suffering with any contagious disease, of which fact the said teacher has been cognizant, then it shall be the duty of said teacher to certify to the same to a member of the School Board, and such teacher shall not perform his or her duties in any public school in this city until a physician attending such case or cases of contagious disease shall certify that all danger from contagion has passed. Failure to comply with the provisions of this ordinance will subject the offender to a fine of ten dollars ($10).

61. When scarlet fever, diphtheria, measles, smallpox, chickenpox, whooping cough, or any other contagious diseases has existed in any family whose child or children have been attending any of the public schools of this city, which child or children had not been attended by any practicing physician, then it shall be the duty of any vaccine physician who may be applied to for a certificate that all danger from contagion has passed to visit the premises, if in his district, where said child or children had been sick, and if there should exist no danger from contagion he should give the certificate applied for free of charge.

62. (Approved May 22, 1893.) The School Commissioners are hereby required and directed to have all public schools in the City of Baltimore opened for the reception of pupils thirty minutes before the commencement of the regular exercises of said schools.

(See also the statute relating to vaccination.)

By resolution approved March 13, 1891, it is provided "That the American flag be raised on all public school buildings where the school buildings are provided with said flags at half-mast on Memorial Day,"

By ordinance approved April 9, 1895, the Board was directed to purchase a sufficient number of American flags and have the same placed on each and every public school building, to be raised on every school-day from the opening of the session in the morning till the close in the afternoon, except on inclement days, and at half-mast on May 30 from sunrise to sunset; principals to be responsible for the performance of the duty, and liable to suspension or dismissal for failure to perform the same. The sum of fifteen hundred dollars ($1,500) is appropriated to defray the cost of said flags and placing them on the school buildings.

By ordinance approved May 8. 1995, the Board was directed to introduce physical training as a regular course of study in the public schools; to employ a male teacher, a graduate of some institution in which the art and science of physical training has been the only object of the course of study; salary to be fixed by the Board, subject to the approval of the Mayor and City Council. Ten minutes each day shall be given to calisthenics. The sum of one thousand five hundred dollars ($1,500) is appropriated to defray the expense.

By resolution approved May 15, 1895, the Board is directed "to issue the necessary directions to the teachers [illegible] to read the Declaration of Independence of the United States to the pupils of their respective classes (in the grammar schools only) on the Friday preceding all national, State or municipal holidays."

By Ordinance No. 140, approved September 21, 1896, Ordinance approved May 8, 1895 (on the subject) was repealed and in lieu thereof the Board was authorized and directed to introduce physical training as a regular course of study in the public schools, to purchase such apparatus as shall be necessary, and to employ the necessary teacher or teachers, the salary or salaries of said teacher or teachers to be fixed by the Board, subject to the approval of the Mayor and City Council.

By Ordinance No. 33, approved June 23, 1897, the name Colored Manual Training School was changed to Colored Polytechnic Institute.

OFFICE OF THE

Commissioners of Public Schools.

BALTIMORE, MD., November 23, 1897.

CIVIL SERVICE RULES ADOPTED BY THE BOARD NOVEMBER 23, 1897.

(By Special Action.)

I.

TENURE OF OFFICE.

A teacher duly elected under the rules of this Board shall hold his or her position during good behavior and efficiency, and who is found to be morally and physically competent. This rule not to conflict with rules relating to the shortage of numbers, but to apply to the annual election, and to be construed only as abolishing the rules requiring annual elections.

II.

ELIGIBILITY IN WHITE SCHOOLS.

The graduates of Baltimore City College, and white males who pass the examination, shall be eligible to first assistant in male grammar schools, and the graduates of the two High Schools, and female graduates of the Maryland State Normal School, and those that pass the regular semi-annual examinations of this Board, shall be eligible to the lowest position—*i. e.*, assistant in the primary school, provided they receive the averages of scholarship which are now or which may be hereafter prescribed; and that no other person whatsoever shall be eligible or shall be made eligible for positions in the schools in charge of white faculties. Graduates of the Polytechnic Institute and those applicants who shall pass the regular semi-annual examination of the Board shall be eligible to the lowest position in the two Polytechnic Institutes, to be selected according to merit to be determined by their averages.

The instructors in the Mechanical Department in these two schools shall be subject to the Civil Service Rules. When vacancies occur in these positions the applicants must pass the examination as fixed by the Superintendent.

III.

ELIGIBILITY IN COLORED SCHOOLS.

The graduates of the Colored High School, and those colored applicants who shall pass the regular semi-annual examinations of the Board, shall be eligible to the lowest position—*i. e.*, assistant in a primary school, in schools wholly in charge of colored faculties, provided they obtain the average of scholarship which is now or which may be hereafter prescribed by the Board; and no other colored person whatsoever shall be eligible or be made eligible.

IV.

LIST OF REGISTERED ELIGIBLES—FEMALES.

The Superintendent shall make a list on which shall appear the names of all registered eligibles who are graduates of the Eastern Female High School, the Western Female High School, the Maryland State Normal School, and female applicants who have passed the regular examinations of the Board. The names of the persons shall be arranged in accordance with the final average scholarship of each, or the average attained at one of the semi-annual examinations, so that the one who has attained the highest average shall stand first, the next highest second, and so on to the lowest; provided that the lowest passing average (75) at the examination shall be equal in rank to 85 on the list, and consequently 76 shall be equal to 86, 77 to 87, and so on.

V.

LIST OF REGISTERED ELIGIBLES—MALES.

The Superintendent shall also make a list of the graduates of the Baltimore City College now on his list and the male applicants who passed the examination, arranged as the foregoing list, and also a list of colored eligibles arranged in the same manner.

VI.

TIME OF REGISTRATION.

Before making up said list the Superintendent shall give notice that said lists will be closed on a certain date, to be fixed by resolution, and that all persons who are eligible must apply to have their names registered upon said lists before said date; otherwise they will be debarred until a certain other date, also to be fixed by resolution, and afterwards said list to be open for entries from the first of June to the first of July of each year.

VII.

VACANCIES.

PART 1. When a vacancy occurs below first assistant in a grammar school, the line of teachers below the vacancy shall be advanced accordingly, and the last position on the line shall be vacant, which position shall be filled by the transfer of a teacher from a primary school (who has not less than two years' experience), or from some other grammar school.

PART 2. When a vacancy occurs below principal in a primary school, the line of teachers shall be advanced accordingly, and the last position may be filled by the transfer of a teacher from another primary school, or by the highest applicant on the eligible list.

PART 3. It being understood that the line of teachers referred to in the above schools shall refer to the rank of teachers as regards promotion. The assignment of the teachers below that of second assistant to be left, as heretofore, to the principal of the school.

VIII.

BASIS OF ADDITIONAL UNITS.

Maturity in years in an applicant deserves consideration, and, therefore, those who remain over on July 1, 1896, on the list of the present year shall each be advanced two units above their present averages, and stand two units higher on the list for 1896 and 1897; and those who are remaining on the last-mentioned list on July 1, 1897, shall be advanced three units for the second year, and two units for those who are over for the first time; and those over for the third time on July 1, 1898, shall be advanced in their averages five units, those a second time three units, and those a first time two units; but after the third advance no further advance shall be made, but the applicants may remain on the list, each retaining the average as it appears on the list after the third advance, each applicant remaining over being entitled to three advances, as above set forth, and no more.

IX.

TIME OF PROBATION.

Every appointee under the above resolutions shall serve a probationary period of twelve months, and the Superintendent or Assistant Superintendent, according to the school, shall make a report in writing at the end of every ninety days, to be joined in by the principal of the school, if he agrees; if not, he or she shall make a separate report touching the fitness and efficiency of such appointee, so that every appointee shall be four times reported to this Board, as aforesaid, before he or she is elected.

X.

PROMOTIONS.

Promotions shall be made to a higher position from the next lower, in the same school, if the Local Committee so decide; but if they deem such a course inexpedient, then the said higher position shall be filled by a competitive examination, open only to those in the said next lower position in the other schools, after due notice. This to apply to all grammar and primary schools.

The line of promotion shall be as follows: The selection for the first or primary grade teacher shall be made from among the faculty

of each school by the Superintendent, Assistant Superintendent, and Principal, and if they cannot agree, then by the Board, whenever a vacancy occurs in said grade. From this grade the promotion shall be to the principalship of the same primary school. If this promotion is not made by the Superintendent, Assistant Superintendent and Principal, then the competitive examination, going no further than subjects taught in the grammar schools, shall be open to the assistants in each primary school, to the assistants in each grammar school, and to all the teachers of the first grade in the primary schools who have taught five years, including the one not promoted, and the one who secures the highest average shall be appointed. The promotion to first assistant in the same female grammar school shall be from the next highest in rank. If this promotion is not made by the Superintendent, Assistant Superintendent and Principal, then the competitive examination shall be open to the same persons, as above stated, for principal of a primary school, and upon the same subjects.

The promotion from first assistant in the same female grammar school shall be to principal. If the Local Committee will withhold this promotion then the competitive examination for the principalship of the female grammar schools shall be open to all the principals of primary schools, all the first assistants of female grammar schools, and to the female first assistants in male grammar schools. The female teachers in English-German schools on an equal footing with any of all the above to be respectively included in what is said above in regard to the female teachers in the other schools.

The promotion from the first assistant in the same male grammar school, if the first assistant is a male, shall be to principal. If this promotion is not made, as aforesaid, then the competitive examination shall be open to all male first assistants, and the examination shall be on the lines of the examination for principals of grammar schools under the present rules of the Board; provided, that no one shall be promoted or allowed to compete in the aforementioned examination who has not had at least five years' experience in teaching.

The colored schools presided over by white faculties (except as hereinbefore stated, the Colored High School, and the Colored Manual Training School,) are included in the above.

When the position of first assistant in a male grammar school shall become vacant, the person whose name stands highest upon the list of registered male eligibles shall be selected to fill the position.

Male teachers holding positions below that of first assistant of a male grammar school shall retain their places upon the list of registered male eligibles as determined by their averages, and shall be appointed in their order to higher positions.

XI.

LIST OF COLORED ELIGIBLES—APPOINTMENTS AND PROMOTIONS.

For the colored graduates and those colored applicants who pass the examinations of the Board, the Superintendent shall prepare a similar

list to the ones described herein for white eligibles, and that appointments be made therefrom for the school now presided over by a colored faculty, and any that may be hereafter established under the same conditions; and that promotions be made in the same manner as above set forth, as far as the same may be possible under the circumstances.

XII.

COMPETITIVE EXAMINATIONS.

If it should happen, at any time, that no one appears willing to submit to an examination in any of the competitive examinations above provided for, or those who submit should, in the opinion of the Superintendent and the Committee on Examinations, be unfit for promotion, as judged by their examination papers, then another examination shall be held, upon due notice, open to the next lower grade or grades.

XIII.

ORGANIZATION OF NEW SCHOOLS.

When a *new school* is to be organized, selections shall be made in the following manner:

When the semi-annual examinations are held in May and November, teachers with the requisite number of years of successful service may qualify themselves for promotion to the various positions in the schools—a suitable examination being set for each position as follows:

1. Principal of a Grammar School.
2. First Assistant of a Grammar School.
3. Second Assistant of a Grammar School.
4. Third Assistant of a Grammar School.
5. Principal of a Primary School.
6. Teacher in charge of lowest Primary grade.
7. Principal of a Colored Primary School.
8. First Assistant of a Colored Primary School.
9. Vice Principal of an English-German School.
10. First Assistant of an English-German School.
11. Teacher of German in an English-German School.

Eligible lists shall be made for these various positions, each list containing the names of those who passed the examinations for the respective positions, the names on each list being arranged in the order of merit, as ascertained by the examinations.

Then, when it becomes necessary to organize a new school, the principal and the other teachers, ranking above the position of third assistant, shall be selected from those whose names stand first upon the respective lists, the one whose name stands first receiving the first appointment, and so on.

XIV.

POSITIONS IN BALTIMORE CITY COLLEGE AND HIGH SCHOOLS.

No one shall be appointed to a position in the Baltimore City College or High Schools who has not passed an examination embracing English composition, and the subject or subjects the applicant, if selected, would have to teach.

XV.

POSITIONS LOST BY SHRINKAGE IN ATTENDANCE.

A teacher duly elected, who loses her situation by reason of the shrinkage in the attendance of any school, shall be placed at the head of the list of eligibles, and shall be appointed to the first vacancy that occurs; and if several thus lose their situations, then the one among them who first loses her situation shall be first appointed, the one who loses next in order of time, second, and so on to the end.

XVI.

EXTENSION OF APPLICATION OF CIVIL SERVICE RULES.

The Civil Service Rules shall apply to Teachers of Music, Drawing, Physical Culture and Sewing. Examinations to be conducted by the respective Superintendents of each department.

The Following Additions to Section X were Adopted at Meeting Held February 15, 1898.

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1. Any male Principal elected prior to the adoption of these Civil Service Rules, below the rank of Principal of a Male Grammar School, may be transferred to the Principalship of a Male Grammar School.

2. Any male teacher elected prior to the adoption of these Civil Service Rules, below the rank of first assistant in a Male Grammar School, may be transferred to the first assistantship in a Male Grammar School.

3. White female teachers, lower in rank than the Principal of a Female Grammar School, and not below that of the first assistant in a Female Grammar School, shall be considered as of even rank with the first assistant of a Female Grammar School, and may be transferred to the position of first assistant in the Female Grammar School, and shall be eligible to promotion to the principalship of a Female Grammar School in the same manner and subject to the same conditions as the first assistant of a Female Grammar School.

The question of the true or deserving status of an eligible who declines the offer of the vacancy was fully and freely considered by your Committee. One member held, and we think logically, that an eligible who declines the first offer should, if we desire to avail ourselves of those who have the highest scholarship marks, be allowed to accept the next or a subsequent offer; but it may be plausibly contended, *per contra*, that to allow such a privilege might have a tendency to induce the eligible to exercise that privilege in a manner prejudicial to some of the schools, especially the colored schools, therefore a so-called compromise ground has been agreed upon by your Committee, and they recommend that an eligible who declines an offer of a vacancy shall be suspended temporarily from the eligible list and allowed to resume his or her place with the attained average at the next semi-annual registration, without a re-submission for examination.

ACTION OF THE BOARD UNDER DATE OF MAY 24, 1898.

The President decided that the lowest passing average was 85, instead of 80, as heretofore, the Civil Service Committee's report of October 19, 1897, advocating this change, having been adopted by the Board.

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ANNUAL REPORT

—OF THE—

WATER DEPARTMENT

—TO THE—

Mayor and City Council of Baltimore,

—FOR THE—

FISCAL YEAR ENDING DECEMBER 31st, 1898.

THE WATER BOARD OF BALTIMORE CITY,

DECEMBER 31, 1898.

HON. WM. T. MALSTER, MAYOR,
Ex-officio President.

GEORGE E. BOYNTON, *President pro tem.*

GEORGE ELDRIDGE, *Secretary.*

JOHN BURROWS,

GEORGE F. JONES,

SAMUEL T. ADDISON,

LEOPOLD STROUSE.

OFFICERS OF THE WATER BOARD.

WATER REGISTRAR:
HENRY C. NAILL.

CHIEF ENGINEER:
MAJ. WM. L. KENLY.

CLERK TO THE WATER BOARD:
HOWARD R. BUCKLEY.

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REPORT.

BOARD OF WATER COMMISSIONERS—CITY HALL,
BALTIMORE, January 1, 1899.

To the Honorable the Mayor and City Council of Baltimore:

GENTLEMEN: In compliance with Article 54, Section 3, of the Baltimore City Code, 1893, the Water Board has the honor of submitting for your consideration its report for the past year:

Amount of revenue received during the year and deposited with the City Register, including sales of 1945 stock and interest from bank on deposits	$1,569,953 02
Balance in hands of City Register, December 31, 1897	12,635 47
	$1,582,588 49
Disbursements paid by warrants approved by Board during the year, including $150,000 surplus paid to Commissioners of Finance	1,425,497 80
Balance in hands of City Register	$157,090 69
(Of which there is to the credit of the Water Board $63,357.72, and to extension of water supply $93,732.97.)	
The revenue for the year from water rates and meter rates was	$797,991 40
Less discount on 1898 water rates	15,030 50
	$782,960 90
The receipts from same sources in 1897 were	753,426 87
Showing an increase in water rates of	$29,534 03
The total net collections, including water rates, plumbing bills, water tax and sundry items for hay and ice from the various reservoirs	$837,953 02
Collections from the same sources in 1897 amounted to	800,706 16
Showing an increase of	$37,246 86

The new system of keeping a daily record of the various transactions of the Water Registrar's office in a large book with appropriate headings, by which the operations of the office can be seen at a glance, has proven a valuable aid in conducting the business of the Department, and safeguards the operation of the same to an extent never before attained.

The contemplated resubdivision of the city into four districts will, in the opinion of the Board, prove a valuable improvement over the old method of keeping the ledgers, and, doubtless, will greatly facilitate the transaction of the business of the Water Registrar's office.

There were 161,275 feet of main laid during the year 1898, varying in sizes from three to forty-eight inches in diameter, locations of which are given in detail in the report of the Superintendent of the Construction Division.

The two seventeen-and one-half-million-gallon engines are now being erected on their foundations in the new Mount Royal Pumping Station, and the station is expected to be completed and the engines ready for service in May next.

The injunction restraining the city from dredging Lake Roland was withdrawn during October last. The Baltimore Dredging Company then signed its agreement, filed its bond and began the preparations for dredging the lake. These preparations are now practically complete, and work will commence as soon as the condition of the weather permits.

In the settlement of the Loch Raven suits the Water Board has acquired the property situated just below the dam, formerly owned by Mrs. Mary R. Hartman. This property is known as "The River Bank Farm," and consists of about 168 acres.

The Board has also acquired about 37 acres, formerly a part of the Lee property. By the terms of the settlement the owners of the property below the dam released the city from all future claims for damage by reason of the deposit from the lake coming on their farms or for the diminishment of the stream, and the plaintiffs above the dam from all claim for damage by overflow.

The Board, after due consideration as to the best means of protecting the water-sheds from pollution, inaugurated during the

month of July. 1898, a patrol system, consisting of a chief and four assistants. The records of the cases of pollution, which are kept in the office of the Water Registrar, prove conclusively that the step was a wise one.

There have been one hundred and sixty-six cases of pollution discovered, and after notice had been served upon the property owners of the sources of contamination on their property, they have in every instance shown a disposition to remove the cause of contamination.

The masonry tower of the West Arlington standpipe has been practically completed. The work on the substructure was begun in the month of November, 1897, and the iron standpipe was completed in June, 1898, when water was furnished to Arlington and part of Walbrook.

The design of the extensions of mains and recent improvements in the system of water supply contemplated furnishing water to the residents of the neighborhoods of Arlington and Walbrook; but as this territory is situated at an elevation ranging from 340 to 460 feet, it was obviously impossible to serve it from any of the existing reservoirs, as the Western High Service Reservoir, being the highest, was located at an elevation of but 350 feet. The West Arlington standpipe was erected at an elevation of 460 feet. The height of the standpipe is 95 feet, and is designed to be filled to the depth of 92.5 feet. Therefore, all the territory elevated above 340 feet, A. M. T., for which a water supply was intended, was grouped into the new Upper Service District and supplied with water from the standpipe.

The casing of the standpipe is built out of Beaver Dam marble and buff brick, and presents a very attractive appearance.

The Water Board has also approved the plans of the architect for the erection of two buildings on the same lot with the West Arlington standpipe. One of these buildings is intended as a dwelling for the keeper of the standpipe and the other as an emergency station.

The great distance from the standpipe to the headquarters of the Construction and Mechanical Divisions of the Water Department renders necessary the erection of a station near the stand-

pipe, in which men and materials may be kept on hand to give immediate attention to such leaks, breaks and other emergencies which may occur on the Upper Service District.

For matter of detail the Board respectfully refers you to the reports of the Chief Engineer and Water Registrar.

Respectfully,

GEORGE ELDRIDGE, *Secretary.*
GEORGE E. BOYNTON,
JOHN BURROWS,
GEORGE F. JONES,
SAMUEL T. ADDISON,
LEOPOLD STROUSE,
Water Commissioners.

ANNUAL REPORT OF WATER REGISTRAR.

OFFICE OF THE WATER REGISTRAR—CITY HALL,

BALTIMORE, MD., January 1, 1899.

To the Honorable the President and Members of the Water Board:

GENTLEMEN: In obedience to the provisions of Article 54, Section 12, of the Baltimore City Code of 1893, I respectfully present to you a report "containing a statement of water takers, the number of cases where the water has been cut off, the number and amount of abatements, the new supplies made, the receipts and expenditures of the Water Board," and a statement of the sources from which said receipts were derived for the year 1898:

RECEIPTS FOR THE YEAR.

From water rates for 1895	$2,184 17	
" " " " 1896	5,489 21	
" " " " 1897	183,154 80	
" " " " 1898	425,701 28	
		$616,529 46
From interest on delinquent water rates		3,518 95
" meters and indicators		181,461 94
		$801,510 35
Less discount on 1898 water rates		15,030 50
		$786,479 85
From back water tax		66 16
		$786,546 01
From interest on deposits in bank		5,719 36
" plumbing bills		42,189 83
" distributing water mains		4 44
" tools and fixtures		37 84
" Jones' Falls Conduit		20 00
" Gay-street yard		1,801 63
" Eastern Pumping Station		19 45
" repairs		1 67
" General Stores—Construction Division		2 09
" " " Mechanical Division		7 91

From Lake Clifton	$2 00
" Lake Montebello	174 00
" Lake Roland	1,025 40
" Loch Raven	304 39
" extension of water supply	97 00
" the Mayor and City Council, arising from sales of 1945 stock	732,000 00
	$1,569,953 02
The receipts for the year exceeded the expenditures	$144,455 22

The number of water takers was 95,664; the number of cases where the water was cut off by withdrawal of ferrule, 341. Of this number 116 were returned by the water taker complying with the law; the number of abatements made was 3,220 and the aggregate amount of said abatements was $26,193.14; the supplies introduced numbered 3,217. Of this number 2,443 were new supplies and 774 were new connections, arising from the severing of private joint-pipe supplies for two or more houses and placing them on a separate tap direct from the water main.

There was a considerable number of discoveries of premises which were either paying no water rate or paying less than the rate established by law, all of which were properly entered upon the ledgers; and hence, the future income of the Water Department will be materially increased from this source.

The amount of uncollected water rates standing on the ledgers at the close of the year is $253,240.67.

While the receipts from ledgers for this year exceed those of 1897 by $29,261.20, the amount yet due exceeds that of 1897 by $37,943.78; hence, these figures show a healthy condition of the resources for future income.

The abatements for this year exceed those of 1897 $8,314.33. This difference arises from the fact that a closer scrutiny was had to unsettled water rate charges for back years that were desperate, and these charges were taken off of the ledgers to clear them of a useless incumberance.

No abatements have been made except upon the closest examination in each case, and consequently the number of instances in which appeals for abatements have been denied has been very large. And, moreover, very many properties have been reassessed

and increased to the rate established by law, and especially has uniformity in the rates upon the same class or description of property or business been kept strictly in view in fixing such rates.

The system introduced in 1897 of sub-dividing the city into eight districts, and the property in each of said districts charged in the ledgers by streets and number of the premises, instead of as hitherto, to the owner of the house has proved a very great improvement over the former plan; but it is now proposed to reduce the number of sub-divisions of the city to four districts, which will be so arranged as to consolidate the streets into a less number of ledgers, and thus greatly facilitate access to the account of any given property, and avoid the confusion and loss of time now encountered in handling double the number of ledgers and the necessity of consulting one ledger for property on one side of a street and another for the property on the other. This, it is confidently believed, will greatly facilitate the transaction of business and lessen the danger of oversights and mistakes, as well as facilitate the annual rendering of bills for water rates.

The services rendered by those employed in the various branches of this office have been rendered with fidelity and efficiency, and, I think, with great satisfaction to the public. The work of this Department, for the most part, is unusually laborious and trying, and yet it has been performed with a high degree of willingness and proficiency, and I cannot, therefore, withhold my sincere commendation of the faithful men who have so well performed their duty.

The introduction of a daily register in which is entered, in the appropriate columns, the transactions of this office, in the ledgers and new supply branches of the same, was opened on September 1, 1898, and has proven most satisfactory as a book of ready reference in the verification of the operations of those branches, and is very valuable in furnishing the data for preparing the monthly and annual reports, and showing at a glance the daily transaction of said branches.

Attention is respectfully invited to the following statements which exhibit in detail the financial transactions of the Water Department for the year 1898:

Statement A—Water Registrar's cash account.
" B—Water Registrar's disbursement account.
" C—Trial balance, general ledger.
" D—Balance sheet.
" E—Gross receipts.
" F—Total disbursements.
" G—Comparative table of receipts for the years 1896, 1897 and 1898.
" H—Abatements.
" I—New supplies and ferrules returned.
" J—Balances remaining on ledgers December 1, 1898.
" K—Revenue shown by ledgers January 1, 1899.

In concluding this report, I beg to acknowledge my obligations to your Honorable Body for your able co-operation in conducting the business of this office.

All of which is respectfully submitted,

HENRY C. NAILL,
Water Registrar.

STATEMENTS.

STATEMENT A.

Water Registrar's Cash Account for the Year 1898.

	Dr.	*Cr.*
To water rents for 1898 ..... $425,701 28		
Less discount 15,030 50		
	$410,670 78	
To water rents for 1897	183,154 80	
" " " 1896	5,489 21	
" " " 1895	2,184 17	
" meter rents	181,461 94	
" plumbing bills	42,189 83	
" interest from bank on deposits	5,719 36	
" " on back water rents	3,518 95	
" water tax	66 16	
" distributing main	4 44	
" tools and fixtures	37 84	
" Jones' Falls Conduit	20 00	
" Gay street yard	1,801 63	
" Eastern Pumping Station	19 45	
" repairs	1 67	
" general stores, Construction Division ...	2 09	
" " Mechanical " ...	7 91	
" Lake Clifton	2 00	
" " Montebello	174 00	
" " Roland	1,025 40	
" Loch Raven	304 39	
" extension of water supply	97 00	
" 1945 Three-and-a-half Per Cent. Water Stock sold	732,000 00	
By deposits with City Register:		
January		$113,317 02
February		202,376 90
March		76,678 32
April		80,162 13
May		63,708 74
June		43,657 35
July		66,260 74
August		31,112 51
September		21,451 70
October		62,262 11
November		16,878 19
December		54,204 79
Water tax deposited with City Register		66 16
Interest from bank on deposits with City Register		5,719 36
Extension of water supply		97 00
Sales of 1945 Three-and-a-half Per Cent. Water Stock		732,000 00
	$1,569,953 02	$1,569,953 02

STATEMENT B.

WATER REGISTRAR'S DISBURSEMENT ACCOUNT FOR THE YEAR 1898.

	Dr.	*Cr.*
To Water board warrants drawn by the Water Board on the City Comptroller during the year	$1,425,497 80	
By extension of water supply		$606,978 42
" interest on loans, 1916, 1922, 1926		310,000 00
" " " " 1945		35,096 25
" Commissioner of Finance		150,000 00
" Loch Raven		70,583 07
" repairs		46,374 85
" Registrar's Department		30,618 67
" Eastern Pumping Station		28,512 86
" service connections		25,984 68
" meter supplies		19,702 70
" miscellaneous, Construction Division		19,139 14
" general stores, Mechanical Division		14,920 83
" Engineering Division		9,067 88
" Western Pumping Station		7,751 74
" Lake Montebello		5,115 84
" current expenses		5,435 50
" Gay-street yard		4,760 90
" general stores, Construction Division		4,327 15
" machine shop		4,274 06
" Lake Clifton		4,049 64
" " Roland		3,209 78
" Plumbing Department		2,734 36
" Druid Lake		2,035 88
" Auditing Division		1,951 49
" tools and fixtures		1,691 37
" printing and stationery		1,581 10
" Guilford Reservoir		1,370 92
" Hampden "		1,197 26
" returned money		1,038 84
" distributing main		939 74
" Mt. Royal Reservoir		864 80
" High-service "		860 85
" Water-shed Patrol		744 33
" fire-plugs		683 61
" Engineer's Department		641 66
" extension of mains		582 01
" Jones' Falls Conduit		354 04
" Lake Clifton yard		277 77
" pumps and fountains		43 81
	$1,425,497 80	$1,425,497 80

STATEMENT C.—Trial Balance, General Ledger, December 31, 1898.

Folio.		Dr.
6	Construction of new work	$8,941,955 27
8	Real estate and water rights	771,718 87
10	Gunpowder real estate and water rights	235,593 23
16	Commissioners of Finance	638,840 00
66	Mayor and City Council, Water Board account	63,357 72
126	Mayor and City Council, extension of water supply account	93,732 97
154	Lake Clifton	4,047 64
161	Guilford Reservoir	1,370 92
177	Distributing mains	2,969,150 80
195	Tools and fixtures	8,993 66
196	Water meters	6,000 00
202	Lake Montebello	4,941 84
225	Druid Lake	2,035 88
228	High-Service Reservoir	860 85
233	Hampden "	1,197 26
237	Mt. Royal "	864 80
240	Printing and stationery	1,581 10
254	Current expenses	5,435 50
258	Engineer's Department	641 66
262	Registrar's "	30,618 67
266	Returned money	1,038 84
276	Pumps and fountains	43 81
281	Loch Raven	70,278 68
316	Lake Roland	2,184 38
325	Fire-plugs	683 61
327	Auditing Division	1,951 49
336	Jones' Falls Conduit	334 04

Folio.		Cr.
1	City Five Per Cent. Water Stock	$5,000,000 00
1	" Four " " " "	500,000 00
1	" " " " " "	1,000,000 00
1	" Water Stock redeemed	4,000,000 00
3	Profit and loss	2,653,684 08
5	Water tax	66 16
7	City Three-and-one-half Per Cent. Water Stock	1,430,000 00
380	Plumbing Department	39,155 47
382	Interest from bank	5,719 36
459	" on water rents	3,518 95
502	Meter rents	181,461 94
639	1895 water rents	2,184 17
641	1896 " "	5,489 21
642	1897 " "	183,154 80
644	1898 " "	425,701 28

STATEMENT C.—Continued.

Folio.		*Dr.*	*Folio.*	*Cr.*
341	Gay-street yard	2,959 27		
342	Lake Clifton yard	277 77		
384	Engineering Division	9,067 88		
386	Extension of mains	582 01		
393	Extension of water supply	1,336,267 03		
396	Service connections	25,984 68		
398	Meter supplies	19,702 70		
418	Discount	15,030 50		
422	Miscellaneous, Construction Division	19,139 14		
425	Machine shop	4,274 06		
427	General stores, Construction Division	4,325 06		
430	Interest on 1945 Loan, 3½% water stock	35,096 25		
466	Eastern Pumping Station	28,493 41		
470	Water Shed Patrol	744 33		
474	Repairs	46,373 18		
478	General stores, Mechanical Division	14,912 92		
482	Western Pumping Station	7,751 74		
		$15,430,435 42		$15,430,435 42

STATEMENT D.

BALANCE SHEET, GENERAL LEDGER, DECEMBER 31, 1898.

Folio.		*Dr.*	*Folio.*		*Cr.*
6	Construction of new work	$8,941,955 27	1	City Five Per Cent. Water Stock	$5,000,000 00
8	Real estate and water rights	771,718 87	1	" Four " " " "	1,500,000 00
10	Gunpowder real estate and water rights	235,593 23	1	" Water Stock redeemed	4,000,000 00
16	Commissioners of Finance	638,840 00	7	City Three-and-one-half Per Cent. Water Stock	1,430,000 00
177	Distributing mains	2,969,150 80	3	Profit and loss	3,126,615 89
196	Water meters	6,000 00			
391	Extension of water supply	1,336,267 03			
67	Mayor and City Council, Water Board account	63,357 72			
126	Mayor and City Council, extension water supply account	93,732 97			
		$15,056,615 89			$15,056,615 89

STATEMENT E.

RECEIPTS OF THE WATER DEPARTMENT FOR THE YEAR 1898.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Water rents, 1898	$37,533 93	$189,458 30	$54,400 51	$16,756 23	$12,808 79	$12,934 40	$9,088 19	$11,344 56	$13,526 17	$9,895 78	$12,153 93	$45,800 49	$425,701 28
" " 1897	32,411 57	17,726 37	20,677 28	17,084 88	45,042 70	25,199 86	10,616 42	9,770 99	2,172 09	1,229 34	493 93	729 37	183,154 80
" " 1896	620 68	461 58	381 90	397 31	940 44	876 92	625 41	619 08	253 33	76 50	105 42	130 64	5,489 21
" " 1895	513 00	510 00	170 50	154 00	259 00	174 00	50 00	168 00	46 00	18 75	38 92	82 00	2,184 17
Meter rents	41,332 90	893 76	7 50	42,493 93	891 73	307 97	41,279 76	3,160 21	202 84	46,548 32	700 39	3,642 63	181,161 94
Plumbing bills	2,106 54	2,105 33	2,748 46	3,418 27	2,887 82	3,470 30	4,198 79	5,718 12	4,834 36	1,297 91	2,805 14	3,598 19	12,189 83
Gay street yard	127 51	420 77	252 89			45 00	30 87	8 41	105 98	13 75	492 80	3 65	1,801 63
Lake Roland	158 12	136 53	58 99	54 82	83 89	179 13	62 72	17 22	62 24	83 30	15 63	112 81	1,025 10
Loch Raven		48 00	21 00	14 00	13 00	26 00	26 08	9 00	94 17	11 00	21 51	20 60	304 39
Lake Montibello	7 00	40 00		20 00		8 00			50 00	25 00	12 00	12 00	174 00
Extension of water supply	8 63			20 88	4 07	28 40		28 15	4 07			2 80	97 00
Tools and fixtures			25 00			2 75	10 09						37 84
Eastern Pumping Station	6 00	9 25			4 20								19 45
Jones' Falls conduit	20 00												20 00
General stores, mechanical division												7 91	7 91
Distributing main	4 44												4 44
Lake Clifton								2 00					2 00
General stores, construction divison								2 09					2 09
Repairs											1 67		1 67
Interest on back water rents	44 09	138 71	253 18	301 87	1,033 10	691 79	369 40	406 19	117 44	62 16	36 52	61 20	3,518 95
	$115,194 41	$211,948 60	$78,997 21	$80,716 19	$63,968 74	$43,944 52	$66,357 73	$31,254 02	$21,468 69	$62,262 11	$16,878 19	$54,207 59	$847,198 00

1945 Three-and-a-Half Per Cent. Stock sold	$732,000 00	
Water tax collected by City Collector	66 16	
Interest on deposits	5,719 36	
		737,785 52
		$1,584,983 52

STATEMENT F.

DISBURSEMENTS OF THE WATER DEPARTMENT FOR THE YEAR 1898.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Extension of water supply	$75,394 50	$52,180 64	$63,564 22	$74,812 47	$60,503 90	$62,199 19	$43,232 54	$28,220 11	$29,734 37	$23,321 73	$52,334 19	$41,480 56	$606,978 42
Commissioners of Finance											150,000 00		150,000 00
Loch Raven	808 61	518 47	2,991 22	1,434 71	595 47	763 97	601 95	56,746 45	1,560 43	1,465 84	2,347 72	718 23	70,583 07
Repairs	1,629 63	909 29	1,901 08	2,064 55	2,519 55	3,564 04	5,979 23	4,729 62	5,772 11	5,895 11	5,369 65	6,040 99	46,374 85
Registrar's Department		2,424 96	2,529 13	2,320 79	2,424 96	2,424 96	2,416 63	2,433 29	2,433 29	2,665 29	2,828 79	5,716 58	30,618 67
Eastern Pumping Station	2,042 45	2,757 51	1,309 22	1,290 84	2,457 30	1,905 84	2,593 22	2,550 39	3,211 46	3,060 98	2,264 41	3,069 24	28,512 86
Service connections		694 63	1,735 59	2,383 37	1,046 53	2,113 66	4,004 14	3,214 12	4,138 67	2,005 67	2,562 41	2,085 89	25,984 68
Meter supplies		289 49	2,349 58	650 87	785 72	394 93	620 29	669 42	7,061 12	3,607 44	2,425 50	848 34	19,702 70
Miscellaneous, Construction Division		334 70	1,149 72	934 91	1,082 73	1,321 70	1,778 66	1,847 49	2,644 77	2,502 92	2,418 57	3,122 97	19,139 14
General stores, Mechanical Division		603 00	833 48	480 10	1,052 92	1,942 70	921 39	1,078 30	2,674 22	2,641 50	814 24	1,878 98	14,920 83
Engineering Division		890 89	739 27	805 20	1,083 20	1,185 53	733 74	842 08	704 20	667 32	1,346 30	70 15	9,067 88
Western Pumping Station	116 08	108 23	82 33	97 55	160 96	256 98	1,397 97	1,645 12	1,025 66	1,005 36	1,538 05	317 45	7,751 74
Lake Montebello	218 60	241 63	251 12	197 38	334 95	759 08	878 75	508 07	434 58	414 89	831 57	45 22	5,115 84
Current expenses	463 02	510 26	820 53	536 60	787 47	417 26	246 52	528 00	295 59	291 09	373 32	165 84	5,435 50
Gay-street yard		161 77	188 61	196 65	209 66	90 36	1,114 42	575 04	257 10	293 02	420 59	1,253 68	4,760 90
General stores, Construction Division		210 56	57 23	26 00	290 45	157 04	122 96	1,062 45	594 99	1,171 63	288 94	344 90	4,327 15
Machine shop		198 92	353 30	330 25	291 37	240 61	467 80	453 85	557 48	396 13	593 86	390 49	4,274 06
Lake Clifton	138 79	81 41	115 52	249 40	147 26	176 21	235 07	2,056 02	187 56	199 21	348 49	114 70	4,049 64
Lake Roland	256 59	130 06	105 10	124 29	458 79	213 69	270 76	427 89	403 52	267 39	516 04	35 66	3,209 78
Plumbing Department	2,019 00	485 13		13 99		4 38	7 95	1 61	202 30				2,734 36
Druid Lake	201 24	96 97	69 42	110 21	225 83	259 18	260 69	156 51	187 33	155 05	300 54	12 91	2,035 88
Auditing Division		435 43	114 58	74 00	176 22	223 30	81 24	110 51	274 51	19 35	88 14	354 21	1,951 49
Tools and fixtures	1,533 12	30 38	25 48	26 78	14 50	15 65	8 64	27 12	4 45	5 25			1,691 37
Printing and stationery	63 77	95 11	153 73	14 50	407 70	34 54	39 92	22 06	280 70	327 55	109 62	31 90	1,581 10
Guilford Reservoir	79 11	71 78	298 70	91 82	86 49	76 05	101 66	64 13	256 63	88 84	126 95	28 76	1,370 92
Hampden Reservoir	42 96	44 67	62 89	45 04	97 12	235 82		138 71	122 63	76 25	171 27	159 90	1,197 26
Returned money	44 82	7 17	261 37	86 93	54 49	89 24	54 67	150 30	17 69	97 99	87 69	86 48	1,038 84
Distributing main	740 89	198 85											939 74
Mt. Royal Reservoir	61 86	57 16	55 90	55 75	72 31	157 78		81 62	89 90	84 45	136 16	11 91	864 80
High-service Reservoir	27 26	50	253 96	44 42	44 26	139 02		42 17	53 81	60 43	110 89	84 13	860 85
Water-shed Patrol									48 00	192 00	275 33	229 00	744 33
Fire-plugs	475 52	208 09											683 61
Engineer's Department	641 66												641 66
Extension of mains		566 01										16 00	582 01
Jones' Falls Conduit	57 12	51 72	48 25	64 54	27 06	27 29	26 66	2 50	12 00	12 00	12 00	12 90	354 04
Lake Clifton yard		1 01	5 89					4 58	29 51		35 54	201 24	277 77
Pumps and fountains	21 53	13 28			9 00								43 81
	$87,078 13	$65,609 68	$82,426 42	$89,563 91	$77,448 17	$81,390 00	$68,197 47	$110,389 53	$65,270 58	$52,991 68	$231,076 77	$68,959 21	$1,080,401 55
Twelve months interest on $6,500,000.00 water stock												$310,000 00	
Interest on 1945 Water Stock												35,096 25	
													345,096 25
Total disbursements for the year													$1,425,497 80

STATEMENT G.

COMPARATIVE STATEMENTS OF RECEIPTS FOR THE YEARS 1896, 1897 AND 1898.

1896.			1897.			1898.		
1896 water rents		$438,777 98	1897 water rents		$426,566 77	1898 water rents		$425,701 28
1895 "		143,865 35	1896 "		153,329 99	1897 "		183,154 80
1894 "		6,338 62	1895 "		5,354 33	1896 "		5,489 21
1893 "		2,405 33	1894 "		1,983 20	1895 "		2,184 17
Meter rents		178,179 41	Meter rents		181,495 91	Meter rents		181,461 94
		$769,566 69			$768,730 20			$797,991 40
Less discount on 1896 water rents		36,458 51	Less discount on 1897 water rents		15,303 33	Less discount on 1898 water rents		15,030 50
		$733,108 18			$753,426 87			$782,960 90
Interest on back water rents		3,134 51	Interest on back water rents		3,060 72	Interest on back water rents		3,518 95
Plumbing bills		40,155 28	Plumbing bills		39,357 19	Plumbing bills		42,189 83
Distributing mains		1,262 40	Distributing mains		2,210 38	Gay-street yard		1,801 63
Lake Montebello		329 97	Lake Montebello		177 20	Lake Roland		1,025 40
Loch Raven		231 03	Loch Raven		219 95	Loch Raven		304 39
Lake Roland		905 27	Lake Roland		1,033 91	Lake Montebello		174 00
Eastern Pumping Station		91 38	Eastern Pumping Station		102 89	Extension of water supply		97 00
Lake Clifton		30 00	Lake Clifton		8 50	Tools and fixtures		37 84
Druid Lake		20 50	Pumps and fountains		1 25	Eastern Pumping Station		19 45
Pumps and fountains		10 00	Repairs		5 33	Jones' Falls Conduit		20 00
Current expenses		112 95	Fire plugs		1 50	General Stores, Mechanical Division		7 91
Engineer's Department		3,083 30	Extension of water supply		378 51	Distributing main		4 44
Profit and loss		3,559 82	Profit and loss		516 67	Lake Clifton		2 00
		$786,034 59			$800,500 87	General stores, Construction Division		2 09
Water tax	$3,267 30		Water tax	$206 29		Repairs		1 67
1945 Three-and-one-half Per Cent Stock sold	12,600 00		1945 Three-and-one-half Per Cent. Stock sold	685,400 00		Water tax	$66 16	
Interest on deposits	712 95	16,580 25	Interest on deposits	3,183 71	688,790 00	1945 Three-and-one-half Per Cent. Stock sold	732,000 00	
						Interest on deposits	5,719 36	737,785 52
		$802,614 84			$1,489,290 87			$1,569,953 02

STATEMENT H.

ABATEMENTS CONDENSED FOR THE YEAR 1898.

	Number.	Delinquent.	Current.	Total.
January	333	$1,447 58	$960 34	$2,407 92
February	379	1,446 61	1,150 92	2,597 53
March	321	954 17	1,190 84	2,145 01
April	176	1,093 60	544 15	1,637 75
May	518	3,731 64	2,209 87	5,941 51
June	235	1,403 60	600 35	2,003 95
July	155	1,065 19	411 72	1,476 91
August	186	1,712 35	682 71	2,395 06
September	97	947 58	324 51	1,272 09
October	269	892 64	797 34	1,689 98
November	173	384 33	598 27	982 60
December	378	337 83	1,305 00	1,642 83
Total	3,220	$15,417 12	$10,776 02	$26,193 14

STATEMENT I.

New Supplies and Ferrules Returned for the Year 1898.

1,833 new supplies	at	$12 00	$21,996 00
610 " "	at	6 00	3,660 00
774 joint "	at	6 00	4,644 00
116 ferrules returned	at	2 00	232 00
			$30,532 00

STATEMENT J.

Balances Remaining on Ledgers, December 31, 1898.

Current water rates	$222,308 79
Delinquent water rates	25,849 98
Meter rates	2,740 34
Plumbing bills	2,341 56
Total	$253,240 67

STATEMENT K.

Revenue Shown by Ledgers, January 1, 1899.

95,664 houses, yielding a revenue of	$653,582 84
Estimated revenue from meters and indicators	210,000 00
Total	$874,582 84

REPORT OF THE CHIEF ENGINEER.

CHIEF ENGINEER'S OFFICE,
WATER DEPARTMENT—CITY HALL,
BALTIMORE, MD., January 1, 1899.

To the Honorable Chairman and
Members of the Water Board of Baltimore City:

GENTLEMEN: I respectfully invite the attention of the Honorable Members of the Water Board to my report as Chief Engineer for the year ending December 31, 1898.

On the 14th of March, 1898, I was appointed Chief Engineer of the Water Board, and assumed charge of the office on the following day. Previous to that time the affairs of the Water Department had been under the management of my predecessor, Mr. Nicholas S. Hill, Jr., and it devolved upon me to continue to completion the extensions of mains and other improvements in the service which had been planned and carried on under the previous administration.

Owing to the diversified nature of the work carried on by the Water Board and the widely scattered locations of its properties, the Engineer's Department has been divided into seven divisions—Engineering, Auditing, Construction, Mechanical, Meter, Pumping and County divisions. The Engineering Division, under the Consulting and Superintending Engineer, Mr. S. G. Brosius, is supervisory and executive, and all plans and drawings are prepared in this division, all orders of importance issued from it, and all work is done under its immediate direction; the Auditing Division, with the Chief Clerk, Mr. Leonard H. Durling, at its head, has charge of all accounts of the Chief Engineer's Department, and a careful record is kept by this division of the receipts and disbursements of materials; the Construction Division is in charge of

the Superintendent of Construction, Mr. Charles Krause, and to this division has been committed all work on extensions of and repairs to mains, making and repairing service connections, repaving, etc.; the Mechanical Division, under its Superintendent, Mr. Edward G. Rost, has charge of the Gay street yard and the machine shops at Oliver and Wolfe streets; the Meter Division, which is now in charge of Mr. Francis G. Sweet, does all necessary work in connection with water meters and metered supplies; the Pumping Division, under Mr. M. C. Barclay, the supervising engineer of pumps, has under its care the various pumping stations and the operation of the boilers and engines with which they are equipped; and the County Division, under Mr. William Benthall, Engineer and Superintendent, has charge of the lakes and reservoirs, and the property of the Water Board in the county.

ENGINEERING DIVISION.

In the early part of January, 1898, proposals were invited and contracts awarded for all miscellaneous supplies the department expected to require during the year. Previously the custom of the department had been to purchase miscellaneous supplies as needed from the dealer who offered the best prices, and, therefore, this was somewhat in the nature of an experiment. Some classes of supplies, such as lumber, cement, stone, etc., were obtained in this way at better prices than if they had been purchased as needed from the dealer who sold cheapest, but other classes, such as hardware, tools and paints and oils, could probably have been bought cheaper in the open market, and there was a disposition on the part of nearly all the contractors to charge more than their regular prices for articles ordered from them by the department which were not included in their contracts. The system of purchasing miscellaneous supplies by contract had the advantage of making a standard of prices in the department, which was very convenient for the clerks, and simplified the work of making up cost accounts, but if the cost of all supplies thus purchased be considered, I have no doubt that it was greater than if they had been bought according to the previous custom. Questioning, therefore, whether the experiment has been entirely vindicated by the result, the depart-

ment has asked for proposals this year only for those materials which our experience has demonstrated could be best obtained in this manner. These materials consist of cast-iron pipe and large iron castings, brass and gunmetal castings, small pipe fittings, lumber, coal and wood, and the prices obtained for them have generally been less than the prices paid for the same materials last year, the price for cast-iron pipe being $18.20 per ton this year, as against $19.40 last, small pipe fittings and castings .0167 per pound, against .0172, and lumber about $900.00 for the aggregate amount needed than was paid last year.

In May, 1897, just previous to commencing the recent extensions of mains and improvements in the system of water supply, the Water Board of that year decided to protect the department and the city from suits and claims resulting from accidents, which were considered to be necessarily incident to work of this character. To this end, proposals for accident insurance were informally invited from representatives in this city of companies doing an employer liability insurance business. The most satisfactory terms were offered by Mr. T. T. Tongue, who represented the Standard Accident Insurance Company, of Detroit, Mich., and three policies of insurance were taken out with this company. The first of these policies engaged to protect the department and the City of Baltimore from all claims for personal injuries made by employees; the second, from all claims for personal injuries made by the public; and the third, from claims for personal injuries due to the loading or unloading of wagons and carts. The cost of these policies, based on an annual pay-roll of $100,000, was $3,350.63. As was to be expected, accidents occurred, and between May, 1897, and March, 1898, four men were killed and twenty-seven others more or less injured. As a result, many claims were made on the department, and suits were brought against the city, but all the claims have been adjusted by the insurance company, and its attorneys have defended the suits. The wisdom of resorting to this method for protection was amply justified, for the city probably saved the amount paid for premiums, and the Water Department and City Solicitor's office spared no end of trouble and annoyance.

The policies of accident insurance taken out in May, 1897, expired in May, 1898, and the experience of the department in this respect had been so satisfactory that I reccommend to the Board that proposals be invited to protect the department by the same kind of insurance for another year. This recommendation was approved, and such proposals were advertised for in the regular way. The Standard Accident Insurance Company was the only bidder. The terms offered were the same as those offerred the previous year and were accepted. The insurance company continues to manifest a readiness to take care of all claims and suits for which it has assumed liability, but I am pleased to be able to report that during the present administration of the Chief Engineeer's Office there has not been a man killed or seriously injured by the work of the department which could in any manner be attributed to negligence or carelessness on the part of the department or its employees.

The Mount Royal Pumping Station is nearing completion. The building is under roof and work on it is being rushed as rapidly as circumstances will admit. The boilers, which will furnish steam to operate the new pumping engines, have already been installed, and the engines are now being erected upon their foundations. Assuming that the present progress of work on the new pumping station be maintained, it should be completed and ready for service in August next. When proposals for its erection were first invited the Board expected to have it ready for service in April, 1898, but when the proposals were opened in September, 1897, the price offered by the lowest bidder was found to be $20,000 more than the maximum amount set apart for the purpose. All the proposals were thereupon rejected, and the architect was directed to alter his plans, and the contract was awarded to Messrs. J. J. Walsh & Son. In addition to this delay there were others. The contractors for the sub-structure and superstructure encountered many unexpected difficulties during the progress of the work, and both failed to carry out their contracts within the time agreed upon. As a result of all these delays work on the building will be prolonged for more than a year after the time first set for its completion. But when finished the Mount

Royal Pumping Station will be an elegant and imposing structure, and, indeed, in appointment, size and beauty will compare favorably with any pumping station in the country.

The West Arlington standpipe is also nearing completion. The contractor for the steel work did not finish the tank until August last, and since then the work on the masonry tower has been pushed forward as rapidly as the condition of the weather would permit. Little remains to be done, and such as there is can probably be accomplished in thirty working days. West Arlington and Walbrook are at too high an elevation to be served with water from the Western High-Service Reservoir, and it was to supply these districts that the standpipe was intended. This the department expected to do in May last, or as soon as the standpipe had been erected and tested, but here also delays were met with, and when the lines from the standpipe had been laid and the engines in the Western Pumping Station were ready for service July had far advanced. The standpipe was then charged, and West Arlington and Walbrook supplied with water, and I am pleased to state that, after these places had been once supplied, there were no interruptions to the service, and the supply has been continuous.

A keeper for the standpipe will ultimately have to be appointed to take the place of the watchmen now employed there, and a house will have to be provided for him. The architect, Mr. Henry Brauns, has already prepared plans for a substantial brick dwelling, which will be erected on the standpipe lot as soon as weather conditions become favorable.

In accordance with the expressed wish of the Mayor and members of the Water Board, the department has laid its mains and pipe wherever practicable in alleys, instead of the streets. Very frequently, however, this has not been practicable; as mains cannot be laid in private alleys, in alleys less than ten feet wide, or those which terminate in a *cul de sac*. The greatest difficulty in the way of laying mains in alleys is to connect them up, so that the water can freely circulate. Very few of the alleys in Baltimore are continuous, and if pipes are put in alleys which have no

proper outlet, they cannot be connected up with others, and necessarily must be capped or "dead-ended" at their termination. In such pipes the water cannot obtain a proper circulation; it soon becomes foul and stagnant, and a source of complaint from consumers. It is also frequently very much more economical to lay mains in streets than in alleys; and obviously it would be a very questionable financial policy to lay a main in the alley to supply a single row of houses when there is already a main in the street, or if a main laid in the street will supply houses on both sides of the street. In choosing between streets and alleys for the location of water pipes, the matter of cost should be the chief consideration, but the pressure which at times has been brought to bear upon the Chief Engineer to induce him to entirely disregard the consideration of economy has often been very great and difficult to resist. In almost every case this pressure has been due to the anxiety of builders and property-holders to have their houses supplied with water in the manner which costs the least. A charge of $6.00 each is made by the department for service connections from mains in streets fifteen feet wide or less, and $12.00 each for service connections where the mains are in streets of greater width. Of course, the cost to the department for making service connections in narrow streets is generally less than for those in wide ones; and the object of making the different rate was to give the poorer classes and small property-owners the benefit of the difference in cost. In practice, however, the difference in rate has amounted to a charge of $6.00 each for house services connected up at the rear and $12.00 for those at the front. The result of this has been, when buildings are to be supplied with water, the builders or owners generally endeavor to save the difference in cost by inducing the Chief Engineer to make the connections from the rear instead of the front, and their efforts and endeavors in this direction increase with the number of houses involved. I would recommend a single rate for service conections without regard to the width of the street; for I am sure if an uniform rate should be established the Chief Engineer's office would be saved much annoyance, and the cause for a great deal of

friction between the department and property-holders would be removed.

The recently completed extensions of mains have made necessary two complete maps of the city on which to show the location of all mains, valves, fire hydrants, etc., etc.—one a sectional map on a scale of 100 feet to an inch and the other a large map on a scale of 300 feet to an inch. The importance of having these maps was recognized by the last administration and work on the sectional map was commenced just previous to the expiration of my predecessor's term of office, but it was carried on in a very desultory manner and but little had been done in this direction at the time Mr. Hill left the department. Since then work on the maps has been pushed and has now far advanced. To make the maps properly and accurately is a great undertaking, but, when completed, their value for reference will amply repay the trouble and expense of preparing them.

Maps have also been prepared to show the pressure of water in the mains in all parts of the city in daytime and at night. Water pressures vary greatly in different sections, and vary with the time of day, being greatest, of course, when the demand for water is least. In order to have a record of pressures, men were sent out with guages to take the pressure at each fire hydrant, once during the day and once at night. The results recorded by the guages were then reported to the office, where they were plotted on maps provided for the purpose. These maps will also be valuable for reference, for when the exact pressure at any given point is required to be known, they will afford a prompt and easy method of determining it and prevent the delay which formerly was necessary.

In addition to the work on the maps, the drawing-room force has during the year prepared 276 plans for extensions of mains and 106 miscellaneous plans and drawings, many of which involved a great deal of time and labor. The Engineering Division has also during the year located 864 new branches, 961 valves and 3,050 service connections, has inspected 417 private pipes and 376 plumbing connections, and investigated 1,357 complaints.

AUDITING DIVISION.

In the appendix of this volume will be found statements of receipts and disbursements, expenditures, cost of mains and various other cost accounts prepared by the Auditing Division. It will be seen from the statement of disbursements that the disbursements of the Engineer's Department for the year 1898 amounted to $753,878.04, as against $927,320.91 for 1897, being a net decrease in the amount spent in 1898 of $173,442.87.

In the statement of receipts and disbursements the charge for labor includes the sums paid each week to laborers, repair foremen, machinists, carpenters and others, who are more or less temporarily employed, and that of salaries for the monthly payments made to engineers, draughtsmen, clerks and other regular employees of the department, or, in other words, as a general rule, the amounts of the weekly payrolls is charged to labor and the monthly to salaries.

The statement shows that the amounts spent in 1898 for labor and salaries were greater than in 1897. This is due to various causes, and which, under the circumstances, cannot be considered unreasonable. The enactment of the eight-hour law is responsible for the greater part of the increased cost of labor. Indeed, to comply with the provisions of this law requires a much greater expenditure for payrolls than a superficial examination would warrant. It is not only the difference in the number of laborers now required to do in eight hours what was formerly done in nine, but in many instances the employment of shifts of higher-paid help has been made necessary.

The cause for the increased expenditure for salaries in 1898 is the extra appointments made in that year. These extra appointments consisted of engineers, oilers and firemen for the Western Pumping Station, where the engines had been remodeled and put in service in order to furnish water to West Arlington and Walbrook; the inspectors of pay, who also act as timekeepers; a chief inspector and four assistants, for the protection of the water sheds; an engineer to supervise the erection of the standpipe tower; an inspector to supervise the erection of the stack of

the Mount Royal Pumping Station; additional draughtsmen, temporarily employed to work on the maps now being prepared to show the location of mains, branches, valves and fire hydrants, and additional clerks. The clerks employed under the last administration were not sufficient for the requirements of the department, and, as a result, all of them were greatly overworked. Night work was often necessary, and there were clerks who, in order to keep up with their work, found it necessary to work not only at nights, but often parts of Sundays as well. The injustice of this being apparent, additional clerks were appointed by the present Board, so that the clerical work of the department could be accomplished within the usual office hours. The eight-hour law is also responsible for a part of the increase in the salary list of 1898; as, for example, the engine-room forces, whose pay is charged to salaries, formerly worked in two shifts of twelve hours each, but in order to comply with the law, and work each shift eight hours, two extra ones were appointed. Each shift consists of an engineer, fireman and oiler, and the pay of a shift is $197.50 per month.

The system of accounts inaugurated by my predecessor in 1897 has, with some slight changes, been followed throughout the year. The chief clerk of the Auditing Division, in his report, which I submit, suggests that the plan of keeping accounts in this office be sufficiently modified to conform to that of the Registrar's Department. While I appreciate that Mr. Hill's system has many points of advantage over the one it displaces, it seems to me if an agreement could be made with the Registrar's Office to have the two methods of keeping accounts conform with each other, it will be more satisfactory and convenient for all concerned to make the modification which the chief clerk suggests.

The quarters occupied by the Water Department in the City Hall are too limited to afford desk room for all the clerks of the Auditing Division, and some of them have had to find accommodations in the Old City Hall. The chief clerk calls attention to the decided advantage it would be if all the clerks of his division could be brought together, so as to be under his immediate supervision. The disadvantage of having the clerks of the Auditing

Division located in different buildings is obvious, and I regret that want of space renders impracticable any immediate change in this state of things. The need of better office facilities for the Water Department is urgent, and this was called to the attention of the last administration by the Chief Engineer in his report for 1897. There is nothing I can add to what he has said in this connection more than to endorse the recommendations he has made.

CONSTRUCTION DIVISION.

With the exception of the short seetion of 48-inch suction main, to be laid across the North Avenue bridge to the Mount Royal Pumping Station, all extensions of mains and other improvements in the city's system of water supply contemplated by the department, at the recommendation of Mr. Samuel M. Gray, have been practically completed. There remains, however, a great deal which must be done before the system of supply can be considered complete.

One of the improvements recommended by Mr. Gray, on which no action has been taken, was the construction of an additional High-Service Reservoir in the neighborhood of Walbrook, with a capacity of 75,000,000 gallons, at an elevation of 350 feet above mean tide, to be supplied with water through a 30-inch force main, laid from the Mount Royal Pumping Station up North avenue. There is but one main now leading to the Western High-Service Reservoir, which is used both as a force and distributing main. As the capacity of this reservoir is but 26,000,000 gallons, there would be only a little more than a day's supply of water for the high-service district. Should there be a break in the main near the pumps, and if there should be a break in the main close to the reservoir, the entire supply of the district would necessarily be shut off. To overcome these disadvantages Mr. Gray has recommended that the force main leading to the new reservoir should also be connected with the Western High-Service Reservoir, so that the whole supply from this reservoir would not be dependent upon one pipe, as it now is. The demands on the Western High-Service Reservoir in summer are often so great that the department is

severely taxed to supply them, and if the new reservoir be built and line laid to it in accordance with Mr. Gray's recommendation, the efficiency of the high service will be assured and the demands on it for many years to come provided for. Indeed, unless this reservoir be built, the full capacity of the pumps in the Mount Royal Pumping Station cannot be availed of. As it now is, the pumps in the station are designed to pump from Lake Clifton to the Middle and High-Service Reservoirs. To keep both of these reservoirs full would require them to be in operation but a part of the time, and it was in contemplation of an additional high-service reservoir that the pumps were recommended.

According to the estimate of Mr. Gray, the proposed reservoir would cost $450,000.00, inclusive of the cost of the site, and the force main to the reservoir would cost $60,000.00, making the total cost of reservoir and main ready for service $510,000.00. It is only a question of comparatively a short time before the necessities of the city will make the construction of the reservoir imperative, and as it will be such an obvious advantage to the high service, I would recommend its construction without further delay.

There is yet another line of distributing main which should be laid to supply the needs of the extreme western section of the city, in the localities of the Powhatan road and Irvington, as this section is without sufficient water, which was amply demonstrated during the fire last summer which destroyed the car barns of the Consolidated Railway Company at Irvington. This line is a 20 inch line and was originally intended to have been laid out Edmondson avenue, but afterwards Franklin street was decided upon in order to avoid the bridge and other obstacles which would be met with if the main should be laid in Edmondson avenue. This extension is not of those suggested by Mr. Gray, but one since proposed to meet the necessities which developed after the work on the extensions had far advanced.

On June 4 a circular piece of 30 inches in diameter was cut from the 40-inch main in West Lombard street, for the purpose of connecting this main with the 30 inch line laid down Sharp street, and on November 21 a cut of 30 inches in diameter was made in the 30-inch main at the intersection of Mount Royal avenue and

Lennox street, so as to connect two 30-inch pipes at that point. Both of these taps were successfully made by the use of the A. P. Smith pipe-tapping machine, without shutting off the water from consumers. This method of making connections between large mains is a very great improvement over the old, where it would have been necessary to shut off water in the main to be tapped, and to have kept it shut off during the whole operation, which would probably have occupied more than twelve hours.

At different points along the water front, where mains had been laid to the end of a street, blow-offs had been inserted at the terminals of the pipes, to answer the double purpose of flushing out the mains, when necessary, and furnishing the city's steam vessels with water for their boilers. Early in August last it was reported to the department that water was being taken at the blow-offs without authority, and used to supply other vessels than those belonging to the city. To remedy this, and to prevent the water from being used by unauthorized persons, the blow-offs were connected up so that all of them, with a single exception, would be below the level of the water at low tide; the exception being the one at the foot of Patterson street, which was placed under lock and key of the Yale pattern and keys furnished only to the engineers of the police-boat and quarantine tug, with the understanding that they were not to go out of their possession.

The cost of repairs to mains in 1898 was necessarily greater than 1897, due to the great amount of repaving the department has been required to do over the long lines of pipe laid in 1897. In fact, there were nearly five times more repaving done in 1898 than in the previous year; there having been 1,329,118 square feet of street repaved in 1898 as against 296,624 feet in 1897, and despite the increased cost of labor the expense of repaving in 1898 was 16 per cent. less than that done in 1897.

The other general and miscellaneous repairs made by the Construction Division of the Water Department in 1898 were much more numerous than in 1897, and at nearly a corresponding cost. Want of space prevents a comparison, which would be very difficult in any event, for when comparing the cost of general and miscellaneous repairs of different years the nature of the repairs

made must always be carefully considered, as well as the season in which they were made.

For a more detailed description of the work done by the Construction Division in 1898, I refer to the accompanying report of the Superintendent.

MECHANICAL DIVISION.

The Mechanical Division during the year has chiefly been engaged with routine work of making and repairing valves, fire hydrants and street fountains, and making and repairing tools and other appliances for the various divisions of the department. The shops have been operated for full time during the year, and have turned out 952 stop valves of different sizes, from two to eight inches in diameter, 106 fire hydrants, 12 street fountains and 50 meter strainers, and extensive repairs were made to 46 valves, 3 fire hydrants and 1 street fountain. A more particular reference to work of this nature done by the Mechanical Division will be found in the accompanying report of the Superintendent.

The railroad trestle in the Gay-street yard connecting with the Union Railroad has been repaired at a cost of $1,164.55. No work of any consequence had been done on the trestle for several years, and the Assistant Engineer of the Northern Central Railway Company, Mr. W. G. Coughlin, complained that it was no longer safe, and offered, on behalf of the Union Railroad Company, to put it in a proper state of repair and charge the department only for the actual cost of the work. As the Union Railroad Company would then be responsible for the cars sent on the trestle, I accepted the offer. The repairs amounted to a practical renewal, and the charge for the work was a very reasonable one.

The matter of painting had been so much neglected in the past by the Chief Engineer's Office that it seemed to have been lost sight of entirely. Some of the buildings of the Water Board had not been touched with paint for may years and the necessity for painting throughout the department was so apparent as to force itself upon the attention of the members of the Board almost immediately after their appointment. Previous to this the custom

had been, when there was much painting to be done, to advertise for proposals and award the contract to the lowest satisfactory bidder, but in this instance, there having been so much more painting necessary than ever before, the Board decided that cheaper and better work could be obtained by purchasing the best materials and having it done by a gang of painters employed by the department. Therefore, a foreman painter and four journeymen were appointed to the Mechanical Division, and in the early part of April the gang was organized and put to work. There have been painted the street fountains, the keeper's house at Druid Lake, the machine shops and the buildings at Clifton, Montebello and Loch Raven. All of these have been done in a very satisfactory and workmanlike manner, much better than if done by contract, and probably at less cost. A great deal yet remains to be done, sufficient to keep all the gang busy for some months to come.

The machine shops and other property of the department at the Eastern Station is in a most satisfactory condition.

METER DIVISION.

Until May, 1898, all work relating to water meters or metered supplies was done by the Construction Division under the supervision of the Superintendent of Meters. This work had, however, become so extensive and important that the present members of the Water Board decided in May last to create an additional division out of the department, to be entitled the Meter Division, to have sole charge of meter work. Mr. E. G. Nicewarner was the first Superintendent appointed.

The number of metered supplies have been increasing from year to year, and the recent resolution of the Board requiring all supplies beyond the limits of the city to be provided with meters will no doubt increase the meter business to a greater volume than has ever been known before in the history of the department. This resolution requires that all private dwellings in districts outside of the city limits shall be supplied with water through a meter, and shall be charged at the rate of 20 cents per 1,000 gal-

lons for all water registered by the meter as having been consumed. This is a step in the right direction. Although the increase of revenue from this source may not be appreciable, the waste of water diminished by use of meters will no doubt go far to prevent the increase in the daily per capita consumption of water, which has followed from year to year. Indeed, the time has arrived when methods for the prevention of waste must be considered. As pointed out in the report of the Chief Engineer of the Water Board for the year 1897, the daily per capita consumption has increased from 46 gallons in 1882 to 88 gallons in 1897, and if that ratio of increase be maintained, the present sources of supply will not be sufficient for the demands of the city in the year 1920, or at the time when it is estimated that the population of the city will reach 1,000,000. Therefore, it follows that unless some efficient system be adopted to check this increase in the per capita consumption the Water Board in a few years will be confronted with the problem of finding an additional source of supply, and the expense of bringing it to the city.

The meter-testing apparatus, which was installed in the machine shops of the Eastern Station in 1897, has been overhauled and improved. The small tank, with which the plant was equipped, was not large enough to admit of testing meters larger than one inch. A larger tank, with a capacity of 10,000 gallons, and a Fairbanks platform scale have been added. These additions have greatly increased the efficiency of the plant, and make it possible to test meters up to six inches in size. Care is now taken to have all meters properly calibrated before allowing them to be put in service, and those in service are examined from time to time, and when there is reason to suppose that any of them is not registering correctly it is promptly taken out and tested.

There are yet in service 405 indicators registering water consumed for the operation of elevators. The tendency of the Board has been to replace indicators with meters. This I consider wise, and would recommend that all indicators be thus displaced, for over the indicators a satisfactory supervision cannot be had while the meters are absolutely under the control of the department.

During the year 1898 84 meters were installed, making a total of 1,290 meters and 405 indicators in service at the close of the year. The revenue derived during the year from meters and metered supplies was $181,464.51.

On May 19, 1898, the Water Board passed a resolution that for elevator purposes such meter or meters only shall be used as will meet the requirements of the Board. Messrs. John Burrows, George F. Jones and Leopold Strouse were appointed a committee of three to determine what meter or meters shall be used.

After an investigation, examination and testing of the various makes of meters, the committee adopted the Hersey meter, and the Torrent meter for elevator service to replace indicators. These meters were adopted to replace old type of meter which was dropped as being too cumbersome, and not in keeping with the modern approved style; the Board gave instructions that no others than the above makes be ordered.

On July 16, 1898, a contract was authorized between the Water Board and the Hersey Manufacturing Company, of South Boston, Mass., for said company to furnish to the said Water Board of Baltimore City, for the term of two years, the Hersey and Torrent meters, as recommended by the special committee of the Water Board. Before signing of the said contract the Water Board submitted same to Mr. Leon E. Greenbaum, City Attorney, the question as to the power of said Water Board to enter into and conclude such a contract. Upon receipt of his opinion in the affirmative the contract was duly executed.

PUMPING DIVISION.

As was to be expected, the demands on the water supply were greater during the past year than ever before, and the amount of water required to be pumped correspondingly increased; the increase over the previous year being 1,719,638,466 gallons, and the total amount of water pumped in 1898 was 4,996,789,685 gallons. The greatest demand, of course, was during the summer months, and the high-service reservoirs were most taxed to supply it. In accordance with the plan involved in the extensions of mains,

many sections of the city were taken from the Middle Service and included in the High-Service District. The demand on the high-service reservoirs was therefore to be expected, and we had hoped that it was satisfactorily provided for by the new ten-million-gallon engine (Engine No. 1207) recently installed in the Eastern Pumping Station. This engine was tested officially on January 7, 1898, and fully developed the duty and capacity guaranteed by the contractors. Some defects were, however, observed, which would have to be remedied, and a few alterations were found to be requisite before the engine could be considered perfectly satisfactory and finally accepted; and, in order to remedy these defects and make the desired alterations, it became necessary to shut down the engine at frequent intervals between the 15th of February and 1st of June. The state of the Jones' Falls supply last year was such as would not permit any of the water in Druid Lake to be used to supply the High-Service Reservoir, so that the work of keeping these reservoirs full devolved entirely on the pumps in the Eastern Pumping Station. Therefore, even with the engine in service, the resources of the Pumping Division were severely taxed to meet the demands on the High-Service District, and when out of service the water, especially in the Western High-Service Reservoir, would fall alarmingly low.

The engines of the Western Pumping Station, in Druid Hill Park, have been rebuilt and remodeled at a cost of $16,100. They were originally designed to pump water from the Middle Service (Druid Lake) to the Western High-Service Reservoir, against a head of 134 feet, and have been altered so as to pump from the middle service either to the Western High-Service Reservoir or, against a head of 340 feet to the West Arlington stand pipe. No change was made in their capacity of 3,000,000 gallons each in 24 hours. The contract under which the engines were rebuilt and remodeled was awarded to the Henry R. Worthington Company on October 30, 1897, and the engines were made ready for service in May last. The alterations required three new boilers of greater power than the old ones. The old boilers were therefore replaced by three new boilers of 100-horse power each, furnished by the National Water Tube Boiler Company, of New Brunswick, N. J.

As previously stated, the two seventeen-and-one-half-million-gallon engines are now being erected on their foundations in the new Mount Royal Pumping Station, and the station is expected to be completed and the engines ready for service in August next. It is to be earnestly hoped that this expectation will be realized, so that the pumping engines in the Eastern Pumping Station will not be required to provide for the High-Service District, and the conditions of last year will not prevail. The Mount Royal engines are designed to pump from Lake Clifton to either Druid Lake or the Western High-Service Reservoir, and to the Western High-Service Reservoir from Druid Lake; also, should the necessity arise, they can supply water to the Eastern High-Service (or Guilford) Reservoir. Thus, when ready for service, they will be interchangeable with the engines of the Eastern Pumping Station, upon which the department will no longer be entirely dependent, and a great source of anxiety will be removed.

Accompanying this report, I submit tables prepared by the Supervising Engineer of Pumps, giving the quantities of water pumped and the duties developed during the year by each of the four engines in service, the coal consumed, the total cost of pumping, and the cost per 1,000 gallons of water pumped.

COUNTY DIVISION.

Owing to the extended droughts of last year the supply of water was greatly diminished. The water from the Gunpowder was ample for all requirements, but that from Jones' Falls, especially during the summer months, was insufficient for the Middle Service. It was mainly to this that the difficulty of meeting the demands of the Middle and High-Service Districts during the summer and early fall was due; and frequently during the year the engines of the Eastern Pumping Station were required to supplement the supply of the Middle Service with water from the Gunpowder. While the short supply from Jones' Falls last year, and the conditions from which it resulted, might be considered exceptional, I fear that we cannot hope for any permanent improvement in this respect, but rather the tendency seems to be for the

supply from this source to diminish as the years pass by, a tendency which may be seriously felt as the population of the city becomes larger and the consumption of water increases.

The necessity for dredging Lake Roland is urgent, and it is fortunate that the work will not be delayed much longer. The necessity for dredging the lake was recognized by the members of the previous Water Board, and the contract for doing it was awarded on July 7, 1897, to the Baltimore Dredging Company, but an injunction to prevent the contract from being carried out was almost immediately obtained by a party who was interested in the proposal of an unsuccessful competitor, which prevented the execution of the contract and delayed the work. The injunction was not finally disposed of until October last. The Baltimore Dredging Company then signed the agreement, filed its bond, and began preparations to dredge the lake. These preparations are now practically complete, and dredging will commence as soon as the condition of the weather will permit.

The dredging of Loch Raven with the plant purchased in 1897 from the Harbor, Inland and Improvement Company, will also be resumed in the spring. Owing to the suits hereafter referred to, which were brought against the city by owners of property binding on the stream below the dam, the work was not pushed last year, but now that the suits have been disposed of, there is apparently nothing more in the way, and when dredging has been resumed it will be carried on as energetically as circumstances will admit.

Early in the year 1896 a suit was brought against the Water Board and the Mayor and City Council of Baltimore by Mrs. Henry C. Merryman for damage done to her property near Loch Raven by an overflow of the Gunpowder, which she alleged to have been due to the construction of the Loch Raven dam. The case was tried in the Circuit Court for Harford County, and a judgement for $2,500 was obtained. Encouraged by the success of Mrs. Merryman, other suits of the same nature were entered against the city, and the overflow of the Gunpowder last July was followed by another claim from Mrs. Merryman and her tenant. These cases were all of property-owners above the dam, but those below were likewise alert for an opportunity to profit from the city,

and the opportunity came when the dredging of Loch Raven began. These people claimed that the delivery below the dam of sediment from the bottom of the lake was a menace to their property. Hence, other suits were entered, and suit followed suit, until the aggregate amount of the Loch Raven claims reached nearly $200,000. For a while these cases presented a most threatening aspect, and it was questionable what the end would be. The City Solicitor, Mr. John E. Semmes, was, however, equal to the occasion. The Merryman case had been tried and lost by his predecessor, and had established a precedent which was a very serious obstacle in the way of any satisfactory settlement of the other cases. Notwithstanding this, since he has taken charge of the cases but one verdict, for $250 only, has been obtained, and he has settled all the suits to the satisfaction of the city, with the exception of the one of Jessup, and the second suit brought by Mrs. Merryman and her tenant, which are still pending. Mr. Jessup has no good foundation for a claim. His property was regularly condemned some years ago, and it is hardly probable that this case will ever come to trial. The City Solicitor is not now prepared to say what disposition he will make of Mrs. Merryman's claim, but this property will finally have to be condemned and taken by the Water Board as the only effectual bar to further claims from her and her tenant.

In the settlement of the Loch Raven suits the Water Board has acquired the property situated just below the dam, formerly owned by Mrs. Mary R. Hartman. This property is known as "The River Bank Farm;" it consists of about 168 acres, and the mud from the bottom of the lake can be deposited there. The Board has also acquired about 37 acres which was formerly a part of the Lee property. By the terms of settlement the owners of property below the dam released the city from all claims for damage in the future, due either to the diminishment of the stream or to delivery of deposit from the lake on their lands below, and the owners of property above the dam from all claims for damage by overflow. This is no doubt the very best settlement which could have been made, and Mr. Semmes deserves to be specially commended for the result.

Early in the month of April, 1898, the Water Board recognized that some steps must be taken for the protection of the water

sheds. When the water works were first constructed, the banks of the streams were so scantly populated that there was no reason to apprehend any contamination of the supply, but from year to year the population has rapidly increased; villages and towns have been built in the immediate neighborhood of the dams and water sheds, so that the danger of pollution is no longer remote, but immediate and pressing. The water sheds of Jones' Falls were in an appalling condition, and those of the Gunpowder were far from satisfactory. The situation was one which demanded immediate attention and prompt action, and, after long and careful consideration, the members of the Board decided that the best method to protect the supply would be to have the water sheds patrolled by competent and conscientious men appointed and paid to do this work. There were accordingly appointed, in the month of April last, a force of five patrolmen, consisting of a chief and four subordinates. Great care has been taken to have the men selected the best that could be obtained for the purpose. The chief of this force, Mr. Gideon P. Hopkins, is a very intelligent and energetic gentleman, and those who know him believe that a better selection for the position could not have been made. There can be no question that the supply has already benefited from the system of patrol, for when any of those who live near the streams emptying into the lakes have had their attention called to possible sources of contamination on their property, they have generally shown a disposition to remove or change the location of them, and where cases of refusal to do this have occurred, they were brought to the notice of the Baltimore county authorities. Certainly the time has come when protection for the water sheds is demanded, and unless the greatest vigilence is exercised their condition will soon become a menace to the health of the public. The water patrol probably affords the best temporary means of protection, but I am emphatically of the opinion that for the city to acquire the property which includes the water sheds is the only satisfactory solution of the problem, and I would strongly recommend that this be done as soon as the financial condition of the city justifies it.

There have been no extensive repairs or improvements made in the County Division during the past year, and there was but very

little necessary to be done in this respect. The old screen in the gate-house at Lake Clifton has been removed and replaced with a new one at a cost of $1,906.60, and a new screen has been placed in front of the screen well of the Western High-Service Reservoir at nominal cost.

In the appendix (Appendix L) will be found tables showing the capacity of and clear water used from each source of supply during the year 1898; also, the same tables for 1897, which were inadvertantly left out of the report for that year.

I am pleased to be able to report that all the property of the Water Department in the County Division is in excellent condition.

CONCLUSION.

Accompanying this report, I submit one from each superintendent or chief of division. In these reports will be found a more detailed account of what has been accomplished by the various divisions during the year than I have been able to give.

It has devolved upon this administration to finish a work planned and carried on by others on lines laid down by them. This is always a delicate and generally an unthankful task. If we have completed this task satisfactorily, as I believe we have, it is to the heads of the divisions that much of the credit is due, and, in conclusion, I desire to thank them for their zeal and efficiency, and for the efforts they have displayed to keep the department to the high standard it has always maintained.

Respectfully submitted,

MAJOR WM. L. KENLY, *Chief Engineer.*

Report of the Engineering Division for the Year 1898.

CONSULTING AND SUPERINTENDING ENGINEER'S OFFICE,
WATER DEPARTMENT—CITY HALL,
BALTIMORE, January 1, 1899.

Major Wm. L. Kenly, Chief Engineer:

I herewith submit the following report of work done by the Engineering Division for the year of 1898:

SUPPLY MAINS.

Within this period the water supply of Baltimore City has been materially improved by the inauguration of the Upper Service from the West Arlington stand-pipe and completing and placing in service the following feeders, viz.:

The 40-inch Bolton-street main from Mt. Royal avenue and Lennox street to Lombard and Greene streets.

The 30-inch Hanover-street main from Lombard and Sharp streets to Hanover and West streets.

The 20-inch Columbia-avenue main from Columbia avenue and Scott street to Kent street.

The 20-inch Portland-street main from Columbia avenue and Paca street to Columbia avenue and Scott street.

The 20-inch West-street main from Eutaw and West streets to Cross street and Columbia avenue.

The 20-inch Wilkins-avenue main from Fulton avenue and McHenry street to Wilkins avenue and Millington lane.

The 20-inch Mulberry-street main from Paca and Saratoga streets to Schroeder and Hollins streets.

The 20-inch Hollins-street main from Mount street to Stricker street.

The 20-inch force main from the Western High-Service Reservoir to the West Arlington stand-pipe.

The 20-inch Carey-street main from Pennsylvania and North avenues to Carey street and Layfayette avenue.

The 20-inch Twenty-fifth street main from Twenty-fifth street and York road to Third avenue and Falls road.

The 20-inch Garrison avenue main from Kate avenue to the Old Liberty road.

The 16-inch Liberty Turnpike main from Old Liberty road and Garrison avenue to Chesapeake avenue.

The 12-inch Liberty Turnpike main from Chesapeake avenue to Clifton avenue.

The 12-inch Forrest avenue main from Liberty road to Oakfield avenue.

These lines were successfully charged and put in service, and no leaks or breaks discovered.

There were also a number of lines 10 inches in diameter, and under thrown into service with equal success.

The 48-inch suction main has been completed from North avenue and Washington street to the Clifton Park stop vault, and an auxiliary stop vault at this point is now under construction. The tunnel at North and Greenmount avenues has been completed and the 48-inch connections made there. The original plans for choking this main at the Lake Clifton end to a 40-inch area and at the western end in crossing the North Avenue Bridge to less than a 34-inch area has been changed, so that the full capacity of the 48-inch area will be obtained. The material is now on hand, and as soon as the weather permits this line will be completed and connected with the Mt. Royal Pumping Station.

The connection for the 10-inch main in Pratt Street with the main in Central avenue going through the Central-avenne sewer has been made. A 30 x 40-inch pressure tap has been made at Sharp and Lombard streets; a 30 x 30-inch at Lennox street and Mt. Royal avenue; a 15 x 16-inch at Madison avenue and Rose street; and the 20-inch main crossing at the Belt Line Huntingdon Avenue Viaduct.

Many other connections of less importance have been put in, which, in addition to the North-Avenue Bridge crossing for the suction main yet to be made, increases the total cost per linear foot of pipe laid. In order to arrive at the true cost of the lines commenced in 1897 the expense of the necessary connections and special work required to complete them should be added to the cost of the straight line pipe. This amount divided by the total

length of the line will give the cost per linear foot of the finished main.

Considerable difficulty was encountered in charging the 20-inch force main from the Western Pumping Station to the West Arlington stand-pipe on that section between the station and the Western High-Service Reservoir, which, in addition to having been in service thirty years, was required to stand an increase in pressure of about 100 pounds per square inch. It was only after the weaker section had given away and been replaced that this main could be put into service. A check valve has been placed at the High-Service Reservoir to prevent loss of water should a collapse again occur. A new main will be required to replace this section in the near future.

The proposed 30-inch main extension from Lombard and Eutaw streets to Columbia avenue and Poppleton street, which was designed to feed the Columbia avenue main, has been abandoned, and the 10-inch main on Columbia avenue from Scott street to Barre street has been replaced by a 20-inch main and connected with a 20-inch main which has been laid on Barre street from Columbia avenue to McHenry street, to Fremont avenue, to Portland street, to Columbia avenue, to Paca street, to connect with the 20-inch main which is fed by the 40-inch main in Lombard street.

The Columbia avenue 20-inch main is fed by the 20-inch main just described, by the 20-inch main on West street connecting the new 30-inch main in Hanover street, and also by the 10-inch main in Howard street. The 40-inch main in Lombard street is now drawn on for its full capacity by the 30-inch and 10-inch mains in Sharp street and the 10-inch main in Hanover street, the 20-inch main in Paca street, the 10-inch main in Howard street, and the various service mains branching from it east of Hanover street.

By reference to the accompanying drawings it will be seen that all the mains are interlaced and that the elevations make the natural flow of water to feed the Columbia avenue line from the West street 20-inch main, which will be reinforced by the new 20-inch main just laid.

This has effected a saving of $12,500, and the supply has been found to be perfectly satisfactory.

In traversing with water mains the sewers on Central avenue and Penn street, respectively, the original plans have been changed, so that the line of water pipe instead of passing under the sewers is projected across the tops of them by tearing out a few feet of the arch of masonry and firmly embedding the mains upon the crowns; and by this deviation from the original plan we have finished the work at less than one-half the cost estimated in the first draught.

The 20-inch main originally designed to be laid on Edmondson avenue west from Fulton avenue has been changed to Franklin street. This will avoid building a pipe truss over the B. & P. tracks at Edmondson avenue, and will effect a considerable saving.

PIPE STANDARD.

The double standard of pipe known as Class "B" and "A" has been abandoned. Class "B" is from 10 per cent. to 15 per cent. heavier than Class "A." The former was used in the middle and high services. Class "A" has been adopted for all services, as the pressures on the mains in the several services vary to such a degree that in some instances the low equals, or, in fact, exceeds many of the middle or high-service pressures. Class "A" has been found amply strong for duty in all the services. This will effect a saving of from 10 per cent. to 15 per cent. in the cost of the pipe.

The water pressures in the city vary greatly, ranging from 5 pounds per square inch to 125 pounds, the higher pressure being largely in the residence portion, while the business section, where, on account of the large interests to be protected a high-pressure fire service would be valuable, is left to the lower pressures.

WATER SERVICES.

The city is divided into four water service districts—the lower, the middle, the high and the upper—supplied under a water head of 163, 217, 350 and 550 feet, respectively, above the line of mean low tide.

In the several districts there exist areas of comparatively high elevation, inadequately supplied from its service. To remedy this, plans are now being matured for a nearer equalization of the pressures throughout the city by means of mains to be laid in a Lower-Service District, but fed from the next higher, so that an

increased supply can be furnished where required without subjecting the pipes in the low-lying areas to excessive strains, which would damage not only the service mains, but also the house plumbing.

I have to report that during this administration not a man has been seriously injured in the discharge of his duties by his fellow-workmen or through fault of the department.

GENERAL OPERATIONS.

1. Designing and locating the large pipe lines for the better circulation and an increase in the pressures of the water throughout the system; designing and locating lines of 6-inch and smaller pipe for supplying applicants for service connections and connecting up dead ends.

2. Designing screens for Lake Clifton gate-house, standard service cocks and ferrules, standard gate valves, special rammer, couplings for meter-testing machine, special connections and crossings on large pipe lines, special parts and alterations on trenching machine, stable at Lake Clifton, special steel girders for supporting 36-inch pipes on North Avenue Bridge, special steel girders for carrying 20-inch line over Gwynn's Falls at Franklin street, tank and scales for meter-testing machine and standard fire hydrant.

3. Preparing drawings for details of masonry, cut stone work, carpenter work, changes in doorway and windows, drainage plan, special manhole frame and cover and 6-inch blow-out pipe for the West Arlington stand pipe.

4. Preparing drawings for special flanged pipe and fittings for Mount Royol Pumping Station, iron grating for engine No. 1207 at Eastern Pumping Station, plan for paving at Western Pumping Station, supports for condensers at Western Pumping Station.

5. Preparing plans for inserting blows on lines of 30-inch pipe connecting Hampden Reservoir and Druid Lake, and special branches for same, masonry arch over 48-inch suction main at North and Greenmount avenues, brick piers and cast-iron plates for ends and fittings on 20-inch pipe lines, pipe connections at High-Service Reservoir, plan showing connections between reservoirs, gate-houses, pumps, etc.

6. Preparing sectional maps to scale of 100 feet to 1 inch, each

representing one-half square mile, for the purpose of locating all feeder mains, service mains, stops and fire hydrants, map of Baltimore on 500 feet scale to show rearrangements of service areas, pressures of fire hydrants, etc., indexing drawings, and placing all data and information of the department in convenient and permanent form.

7. Digging test pits on line of proposed large mains, extension, surveying and photographing at Loch Raven in connection with damage suits against the Water Board, surveys at Lake Roland for diverting the course of Magazine branch flowing through Lakeside Park into the lake, surveys for accurately locating the large mains connecting Hampden Reservoir, Druid Lake, Mount Royal Reservoir and High-Service Reservoir, and erecting monuments over the same, laying mains in vicinity of West Arlington, Walbrook, etc.

8. Listing, routing and numbering all fire hydrants.

9. Locating all new services and metered supplies put in during the year; locating all valves, branches and connections inserted on pipe lines and keeping record of the status of all service applications.

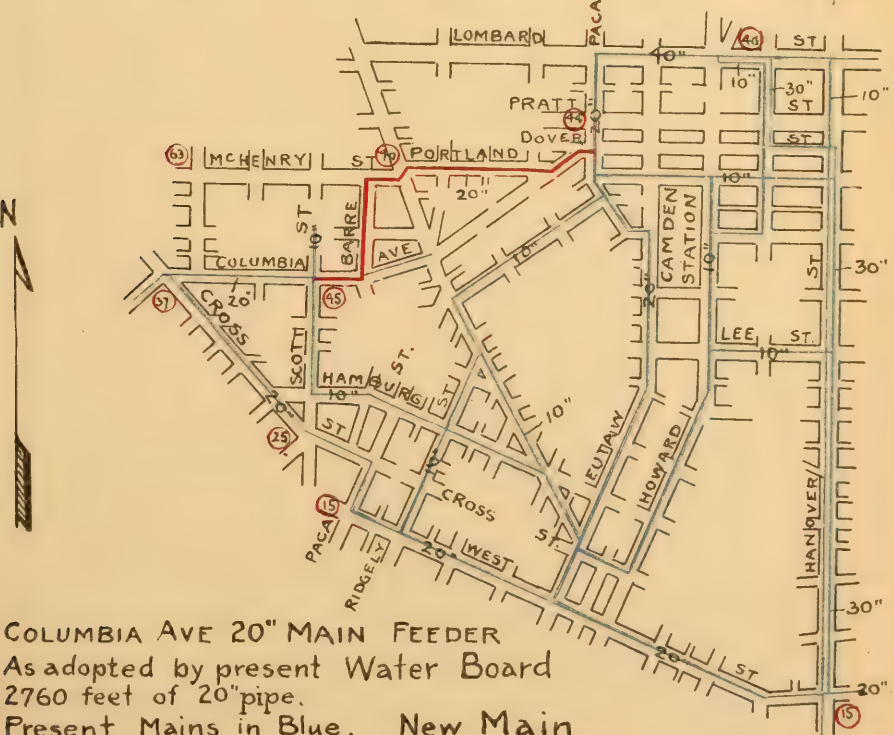
10. Plotting on maps all mains laid in 1898 and supervising the field and construction work, including the Mount Royal Pumping Station, West Arlington Stand Pipe, remodeling Western Pumping Station, etc.

11. Estimating quantities of pipe, special castings, valves and connections required for laying mains; keeping a record of all straight pipe made for the department; of the amount of pipe, of special castings and valves ordered and shipped; of the shipment, receipt, transfer and unloading of all carloads of all such materials, and of the receipt and disbursement of materials at storage yards to lines being constructed.

12. Preparing plans for rearrangement of furniture in drawing office, tressles and drawers for drawing boards, table and pan for washing blue prints and office shelving. Designing various blank forms for foreman's daily report, etc., book for record of service onnections, stock and index books, etc.

I submit tables showing length and cost of mains, main connections and special work laid in 1898.

COLUMBIA AVE 20" MAIN FEEDER
As originally proposed. 4600 feet 30" pipe
Present Mains in Blue. Proposed extension
in Red. Elevations marked thus:- (15)



COLUMBIA AVE 20" MAIN FEEDER
As adopted by present Water Board
2760 feet of 20" pipe.
Present Mains in Blue. New Main
in Red. Elevations marked thus:- (15)

LENGTH AND COST OF NEW MAINS LAID IN 1898.

LAYING PIPE.

MATERIALS.

Diameter	Straight Pipe: Feet	Straight Pipe: Cost	Large Fittings: Cost	Small Fittings: Cost	Special Castings: Cost	Valves: No.	Valves: Cost	Hydrants: No.	Hydrants: Cost	Lead: Cost	Rope: Cost	Fuel: Cost	Lumber: Cost	Bricks: Cost	Cement: Cost	Miscellaneous: Cost
3	3,111	$406 08		$125 22	$31 72	31	$170 28			$119 35	$3 06	$8 93	$1 14			
4	6,124	1,213 12		284 96	32 16	14	216 87	1	$36 78	221 70	1 50	21 27	1 81			.....
6	20,041 8	4,402 00		746 61	128 13	125	1,205 14	11	101 58	1,051 82	18 35	59 53	7 56	$22 50		$11 96
8	36,331 8	12,491 04	$101 71	1,166 52	229 62	212	1,987 16	12	1,105 86	1,901 79	28 70	98 36	10 92			17 47
8	1,147	111 85		30 99	103 78	1	19 71			115 21	1 33	3 68	294 00			109 95
10	4,163	2,251 01	15 75	501 35	10 95	14	364 15	6	217 12	387 68	6 10	19 72	26	27	$72 48	9 75
10	2,957	1,818 25	10 61	486 47	66 50	8	206 77	11	401 38	860 90	10 73	31 56	15 16	98	3 15	12 25
12	1,641	1,209 14	37 95	327 89	2 64	6	76 14	2	73 56	113 18	2 29	3 65	6 15	1 40		
16	6,357	2,966 35	351 01	87 72	90 18	16	636 84	10	367 80	806 91	7 39	13 11	102 17	5 86	3 15	12 10
20	21,324	15,491 80	1,891 25	461 73	185 12	117	3,212 34	21	855 82	3,608 71	39 81	91 18	686 05	47 56	41 96	259 66
24	37,856	61,175 16	2,175 73	1,49 30	639 88	210	5,066 81	16	625 26	6,105 84	53 08	108 32	600 12	88 60	27 35	115 57
30	1,998	15,481 20	192 66	58 09	87 43	10	116 90	1	36 78	1,385 52	16 22	19 32	737 11	153 17	87 50	86 27
36	11,675	60,129 51	2,039 10	216 81	50 81	21	2,035 16	3	110 31	3,874 29	21 93	109 52	3,111 17	286 74	152 66	1,191 67
48	2,089	1,250 25	149 11	10 19	6 27			2	70 00	895 00	11 55	37 61	199 88	1 30	1 08	
Total	162,181	$227,168 88	$7,686 04	$4,624 66	$2,102 49	836	$16,726 11	130	$4,648 18	$21,542 23	$256 31	$748 74	$6,377 10	$608 38	$389 33	$1,829 65

LABOR.

Diameter	Labor: Cost	Hauling: Cost	Total Cost Laying Pipe
3	$827 10	$157 84	$1,910 72
4	1,201 92	243 71	3,505 10
6	3,210 41	621 26	13,075 81
8	7,216 55	1,394 77	29,418 79
8	141 93	71 27	1,966 25
10	1,070 96	183 22	5,081 76
10	1,089 42	427 99	10,729 13
12	108 12	98 97	2,253 27
16	3,595 08	1,100 11	16,669 04
20	13,350 21	2,772 20	65,481 95
24	17,327 82	4,210 51	98,819 18
30	1,116 39	152 19	21,587 82
Total	$82,936 02	$20,813 86	$398,978 01

PAVING

MATERIALS.

Diameter	Bricks: Cost	Stone: Cost	Sand: Cost	Asphalt: Cost
3			$7 60	
4			10 45	
6		$3 20	13 35	$74 55
8	$0 12	5 00	11 05	37 89
8				
10	11 62			
12		1 25	3 95	
16				
20		200 99	57 66	152 63
24	5 56	2 40	16 15	107 36
30		100 70	30 30	1,349 77
36			30 65	895 91
48			80	
Total	$17 30	$763 88	$211 26	$2,616 91

LABOR

Diameter	Labor: Cost	Hauling: Cost	Total Cost Paving	Number Square Feet Paving	Cost of Paving Per Square Foot	Car Fare	Average Cost Per Lin. Ft. As Laid	Total Cost For Year
					Cents			
3	$117 65	$62 55	$217 80	10,886	.02	$10 15	$0 62	$2,138 97
4	243 28	119 77	373 50	17,486	02½	15 35	60	3,893 95
6	520 79	292 08	849 77	45,722	01½	21 80	69	13,917 11
8	669 63	390 69	1,111 38	70,838	01½	67 80	81	30,600 97
8						10	1 67	1,966 25
10	192 09	76 85	280 56	14,758	01½	1 10	1 21	5,366 72
10	520 13	241 37	572 70	26,441	02	11 35	1 12	11,313 18
12	14 79	8 55	22 34	1,744	01	5 05	1 38	2,280 66
16	104 65	98 10	202 75	20,954	01	20 10	2 57	16,831 89
20	2,042 32	1,358 01	3,902 61	132,764	02½	39 95	3 13	67,123 81
24	1,286 22	893 73	2,311 82	125,198	01½	22 35	3 07	101,153 65
30	1,151 29	600 70	3,135 06	57,157	03	15 85	6 61	31,591 82
36	2,107 01	1,066 64	4,627 83	110,892	03	25 30	9 14	106,717 78
48	105 89	32 70	139 74	6,986	02		10 10	21,727 46
Total	$8,919 71	$5,251 77	$17,720 89	671,167	02½	259 15		$416,208 05

LENGTH AND COST OF NEW MAIN CONNECTIONS AND SPECIAL WORK LAID IN 1898.

Diameter	Straight Pipe: Feet	Straight Pipe: Cost	Large Fittings: Cost	Small Fittings: Cost	Special Castings: Cost	Valves: No.	Valves: Cost	Hydrants: No.	Hydrants: Cost	Lead: Cost	Rope: Cost	Fuel: Cost	Lumber: Cost	Bricks: Cost	Cement: Cost	Miscellaneous: Cost
3	29	$41 07		$22 39	$8 46	3	$62 57			$30 17	$0 49	$1 92				
4	105	70 71		16 02	7 29	3	96 92			55 63	83	3 60				
6	120	51 92		13 81	1 70	2	77 3	1	$36 78	21 62	16	1 20				
8	291	153 86		15 75	9 18	5	144 34	35 00		17 04	49	1 38				
8	63	28 62	$602 00	70 16	3 33	4	50 02			16 20	73	1 99	$20 68	$10 19		
10	14	15 62		32 87	8 54		140 68			30 31	95	2 31	71 16	3 25		
12							190 00									
48	92	718 23		30 11	3 36		20 42			141 39		22 89	110 27	266 50	$364 35	
Total	1,276	$1,102 65	$602 00	$253 62	$41 86	17	$1,082 18		$71 78	$355 36	$3 95	$38 29	$205 41	$310 24	$364 35	

LABOR.

Diameter	Labor: Cost	Hauling: Cost	Total Cost Laying Pipe
3	$122 82	$32 47	$322 36
4	186 62	35 98	503 60
6	96 60	22 63	312 28
8	208 60	10 60	608 42
8	624 52	67 93	960 99
10	250 33	14 45	663 77
12			
48	2,240 22	321 04	4,248 78
Total	$4,199 71	$584 36	$8,599 16

PAVING

MATERIALS.

Diameter	Bricks: Cost	Stone: Cost	Sand: Cost	Asphalt: Cost
3			$0 75	
4			1 01	
6				
8		$2 50	20 01	
8				
10				
12				
48		58 31		
Total		$63 99	$22 13	

LABOR

Diameter	Labor: Cost	Hauling: Cost	Total Cost Paving	Number Square Feet Paving	Cost of Paving Per Square Foot	Car Fare	Average Cost Per Lin. Ft. As Laid	Total Cost For Year
3	$22 17	$6 15	$29 07	871		$1 30		$352 74
4	11 97	1 67	17 68	971		1 90		423 18
6	5 82	2 10	7 92	315		1 30		321 30
8	15 55	6 00	21 85	868		2 20		630 17
8	19 28	23 67	95 39	440		2 55		1,059 03
10			3 12					666 89
12								979 26
48			58 31					1,307 12
Total	$104 79	$42 59	$233 17	3,161		$7 25		$8,849 18

RESUME OF WORK DONE.

Feet of Pipe Laid.

3,414 feet of 3-inch, 6,424 feet of 4-inch, 20,041⅓ feet of 6-inch A, 37,534½ feet of 6-inch B, 1,172 feet of 8-inch, 4,403⅔ feet of 10-inch A, 7,937 feet of 10-inch B, 1,641 feet of 12-inch B, 6,537 feet of 16-inch B, 21,524 feet of 20-inch A, 32,853⅓ feet of 20 inch B, 4,938 feet of 30-inch A, 11,673 feet of 40-inch A, 2,089 feet of 48-inch A, making a total of 162,181⅝ feet.

MISCELLANEOUS ITEMS.

1898.	New Branches Located.	Valves Located.	Service Connections Located.	Meter Supplies Located.	Plumbing Connections Inspected.	Private Pipe Inspections.	Meters Read.	Plans made for Extension of Mains.	Fire Hydrants Erected.	Miscellaneous Plans and Drawings.	Complaints Investigated.
January	68	66	144	5	26	....	20	4	1	6	77
February	49	52	176	7	33	....	45	6	11	8	116
March	147	111	143	6	37	7	1,642	30	17	7	113
April	159	111	208	6	38	5	149	29	20	14	92
May	91	91	306	8	31	56	16	26	17	7	65
June	129	119	261	10	38	70	1,656	36	16	6	102
July	47	87	397	10	25	78	125	34	14	3	110
August	45	108	370	6	34	58	1,136	20	11	9	126
September	22	30	378	5	34	37	932	20	14	19	125
October	32	48	306	7	36	34	64	29	18	17	108
November	33	60	179	12	19	29	619	29	3	7	159
December	42	78	182	8	25	43	986	13	17	3	164
Total	864	961	3,050	90	376	417	7,390	276	159	106	1,357

Respectfully submitted.

S. G. BROSIUS,

Consulting and Superintending Engineer.

Report of the Auditing Division.

OFFICE OF CHIEF CLERK, WATER DEPARTMENT,
BALTIMORE, January 1, 1899.

Major Wm. Kenly, Chief Engineer:

DEAR SIR: In accordance with time-honored custom, I have the honor to submit the following report as Chief Clerk in this Department:

Coming into the office near the close of the administration of Mr. Nicholas S. Hill, as Chief Engineer, the system of accounts inaugurated by him has been continued throughout the year. Without doubt this plan possesses some points of excellence, but I will suggest that it would be more satisfactory, as well as a saving of time, if the accounts here and in the Department of the Water Registrar were kept upon the same plan.

During the year all bills rendered to this department have been carefully audited, and no bill has been approved until every item has been carefully compared with the proper vouchers and found to be correct.

All purchases of material, with few exceptions, have been made upon written orders, and from the lowest bidder. In those lines in which a large amount was to be purchased, advertisements were inserted in the daily papers of the city, and carefully prepared specifications were furnished to all who desired to compete. All bids were carefully tabulated and compared. In each case the offer most favorable to the city was accepted, thus insuring excellence of quality and economy of expenditure.

It would be of decided advantage to the department if the whole clerical force of the department could be brought together in the same or contiguous rooms, instead of being distributed, as is now the case. In this manner closer supervision could be possible, with its usual superior results. Perhaps such an arrangement cannot be provided at present, but may become possible in the future.

Accompanying this report will be found carefully tabulated statements, covering the work of the year and giving a fair idea of the character and variety of material used and work done by the Department.

In conclusion, I desire to return my sincere thanks to all with whom I have been associated in my work for their uniform courtesy and kindness, and especially to you, as Chief of the Department.

Yours truly,

L. H. DURLING,
Chief Clerk.

DISBURSEMENTS.

Items.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
West Arlington stand-pipe		$10,150 66	$3,559 19	$2,128 00							$7,882 96	$1,042 00	$24,762 81
Books, printing and stationery	$380 08	270 93	165 78	254 51	$223 30	$126 37	$139 20	$283 86	$7 75	$284 24	384 49	359 59	2,880 10
Drawing materials	14 46		12 54		4 24	6 46		34 75	14 00	32 00	8 00		126 45
Office furniture and fixtures	106 00				50 00		38 70					13 00	207 70
Light and fuel	1,712 18	452 84	32 85	1,493 08	957 50	1,126 93	1,158 04	1,936 21	1,831 28	223 65	1,817 57	19 38	12,761 51
Salaries	4,882 06	4,895 25	5,278 30	6,139 96	6,231 35	6,734 86	7,367 98	7,715 85	7,803 30	7,822 32	7,941 13	7,856 32	80,668 68
Labor	16,864 39	13,156 37	17,009 14	25,502 01	18,875 44	21,221 90	24,471 99	20,529 19	24,247 14	19,982 90	18,640 57	24,312 09	244,813 13
Hauling	493 66	433 09	1,298 90	797 98	376 56	337 26	175 81	134 84	236 93	640 26	350 84	455 31	5,731 44
Mt. Royal Pumping Station	7,697 90							2,987 33	2,768 77	1 00	76 26	2,758 28	16,289 54
Pumps and boilers	6,508 05	5,400 00	6,300 00	2,250 00	1,800 00		12,016 80						34,274 85
Tools and machinery	1,065 72	466 94	528 21	1,067 51	781 74	263 74	1,224 26	331 80	792 25	1,458 32	881 75	153 25	9,015 49
Cast-iron pipe	14,171 07	10,090 34	38,263 44	15,852 91	12,455 20	199 40	727 01	4,906 64	3,727 70	8,713 67	8,952 72	629 00	118,689 10
Large pipe fittings	1,558 76	88 25	57 40		1 80	183 05	81 98	157 26		75 43	240 58	52 50	2,197 01
Special iron castings	1,155 51	176 80	1,184 57	1,900 20	1,965 55	1,745 63	1,042 30	809 76	1,335 03	901 21	1,467 67	706 54	14,390 77
Valves		4,300 70		1,930 95	183 04		1,841 64	584 57	1,194 49	321 11	1,354 45	1,850 95	13,561 90
Wrought-iron pipe and fittings	310 98	634 04			761 25	1,173 85	585 93	1,019 15		584 39	124 74	413 34	5,607 67
Brass castings	66 57	719 23	1,204 88	617 94	1,133 22	808 00	443 24	580 91	753 25	752 23	1,438 55	155 99	8,674 01
Bar iron and Steel	34 18		9 89					29 79		2 10	875 00	103 41	1,054 37
Meters	120 35	2,071 73	379 71	460 00	230 97	67 67	5 00	5,953 10	2,650 00	40 00	91 11	16,527 00	28,596 64
Lead	5,971 24					32 49				598 11	10,405 35		17,007 19
Lumber	1,112 70	395 70	1,088 00	1,188 53	253 53	50 99	220 44	282 58	126 57	404 16	1,043 92	258 89	6,426 01
Rope and Packing	300 55	103 45	43 27	42 98	40 08	35 11	38 15		76 31	75 94			755 84
Waste and oil	188 31	57 85	230 99	190 32	146 80	417 81	277 08	144 25	342 25	195 60	266 64	122 09	2,579 79
Rubber	75 01		52 01	56 29	104 80	113 69	45 76	61 12	58 17	131 22	130 02	82 25	910 34
Bricks, stone and cement	407 78	32 75	413 42	743 44	731 28	348 18	90 88	635 87	130 82	109 75	256 01	110 76	4,010 94
Sand, gravel and ashes	56 00	209 40	157 50	145 10	185 00	222 20	138 65	317 36	251 95	203 45	92 50	54 55	2,063 66
Asphalt paving	322 50	31 53		857 85	1,418 61	645 54	90 69	1,948 00	136 27	94 50	149 97	483 59	6,179 05
Feed		77 67		12 00	81 60		52 20	53 44	77 85		36 78	60 40	451 94
Current expenses	657 37	94 51	1,869 26	1,389 62	9,118 50	348 95	638 68	860 58	420 56	290 77	267 36	222 43	16,178 59
Miscellaneous	765 17	483 05	746 23	3,394 38	780 92	1,434 20	57,721 78	3,127 23	738 60	1,145 52	775 25	1,608 19	72,711 52
Total	$66,998 55	$54,793 08	$79,885 48	$68,415 56	$58,892 28	$37,644 28	$110,634 19	$55,455 44	$49,721 24	$45,083 85	$65,952 19	$60,411 10	$753,878 04

Report of Superintendent of Construction Division.

CONSTRUCTION DIVISION,
OLD CITY HALL, HOLLIDAY STREET,
BALTIMORE, January 2, 1899.

Major William L. Kenly, Chief Engineer:

SIR: I herewith respectfully submit my report of work done during the year 1898.

There were laid in the following localities additional mains on the

LOW SERVICE.

A thirty-inch main from the corner of Lombard and Sharp streets, thence along Sharp street to Dover, to Hanover, to West street. A thirty-inch A. P. Smith pressure tap was made on the 40-inch Lombard street main at Sharp street. The line was begun April 7 and completed September 16. Length, 4,938 feet.

A twenty-inch main from the corner of Eutaw and West streets, thence along West street to Paca, to Cross street, to Columbia avenue, to Kent street. This line was begun in 1897, and finished October 12, 1898. Length, 10,807 feet.

Ten-inch mains as follows: On Charles street between Winder and Jephson, and on Jephson street between Charles and Leadenhall streets. Completed March 12. Length, 2,008 feet.

A ten-inch main on Pratt street between Parkin and Scott streets. Completed December 21. Length, 407 feet.

A ten-inch main and a six-inch main in Smith alley between Gay and Frederick streets. Completed November 21. Length, 220 feet of ten-inch and 24 feet of six-inch.

A ten-inch connection was made through the crown of the Central avenue sewer on the line of Pratt street. Completed August 31. Length, $63\frac{4}{12}$ feet.

An eight-inch main, begun in 1897, was finished January 3, 1898, across the Consolidated Railway Bridge between Bush street and Westport. Length, $1,171\frac{5}{12}$ feet. This pipe was laid on the cross-ties and boxed up.

Work has progressed on the laying of the forty-eight suction main for the Mount Royal Pumping Station during the year. This line extends along North avenue between the bridge and Aisquith street, thence along Lanvale to Hopkins avenue, to North avenue, to Washington street, to the Clifton vault.

On January 12 the gap between the west side of Charles street and the old Lovegrove alley sewer was connected. The main line was extended east to North avenue and Wolfe street, which point was reached March 1. The drift under North avenue and Greenmount avenue was then taken up and completed June 2. The work of pipe laying was again taken up September 19 at North avenue and Wolfe street, and continued to the vault house, near Lake Clifton, where connection is now being made. There yet remains to be laid the connection across North Avenue Bridge. It is proposed to lay two 30-inch pipes across the railroad arches on the south sidewalk of the bridge. The structural iron has arrived on the ground.

A twenty-inch main was begun October 12, and laid from the corner of Columbia avenue and Paca street, thence along Columbia avenue to Portland street, to McHenry, to Barre, to Columbia avenue, to Scott street. On Columbia avenue between Scott and Barre streets, a 10-inch main was taken up and 20-inch pipe substituted. This line is nearly finished, with the exception of twenty-inch connection at Columbia avenue and Scott street.

The following lines are incompleted: A ten-inch on Fort avenue between Hanover and Leadenhall; a six-inch on Leadenhall between Fort avenue and Randall; a six-inch on Curley street between Fairmount avenue and Baltimore street; a six-inch on Leadenhall street between Randall and Wells; a six-inch on Race street between Fort avenue and Beverlin and Clement street, north of Race; a six-inch main on Hoffman street between Stoddard and McCulloh alleys; a six-inch main on Concord street between Eager and Truxton; a six-inch main in alley rear north

side of Reservoir street between Bolton and Callow avenues; a six-inch main on Camel alley between Bolton street and Mason alley, and a four-inch main in Mason alley between Preston and Camel alley.

There were laid additional mains on the

MIDDLE SERVICE.

A forty-inch main from the corner of Mount Royal Terrace and Lennox street, thence along Lennox street to Park avenue, to Laurens, to Bolton, to Hoffman, to Madison avenue, to Orchard, to Tessier, to St. Mary, to Pennsylvania avenue, to Pearl, to Fayette, to Greene, to Lombard street. In the beginning of January we were operating on Orchard street between Tessier street and Druid Hill avenue, advancing northwardly. On February 12 a 40 x 20 double connection was made at Mulberry and Pearl streets with the Mulberry street 20-inch main. On March 11 a 30 x 30 double connection was made at Lombard and Greene streets with the Lombard street 30-inch main. The drift under Park avenue and North avenue was completed May 24. A 16 x 16 pressure tap was made at Madison avenue and Rose street, on December 20, and a 30 x 30 pressure tap was made at Mount Royal Terrace and Lennox street on December 22. There yet remains to be completed the connection between the 40-inch and 16-inch mains at Madison avenue and Rose street, when the line can be put in service.

A twenty-inch main on Fulton avenue between McHenry street and Wilkens avenue, and on Wilkens avenue between Fulton avenue and Millington lane. Completed May 9. Length, 4,107$\frac{2}{12}$ feet.

A twenty-inch main on Paca street between Saratoga and Mulberry streets, on Mulberry street between Paca and Schroeder streets, and on Schroeder street between Mulberry and Hollins streets. This line was begun in 1897 and completed March 7. Length, 5,779 feet.

A twenty-inch main on Hollins street between Mount and Stricker streets. Completed March 8. Length, 831 feet.

Ten-inch mains on Preston street between Montford avenue and Chester street. Completed July 2. Length, 1,217 feet.

A ten-inch main on Orleans street between Milton avenue and Patapsco street. Completed October 14. Length, 814 feet.

A ten-inch main on Lombard street between Paca and Eutaw streets. Completed October 17. Length, 305 feet.

A ten-inch and a six-inch main on Preston street between Montford avenue and Chester street. Completed June 8. Length, $390\frac{4}{12}$ feet of 10-inch and 74 feet of 6-inch pipe.

There were laid additional mains on the

HIGH SERVICE.

A twenty inch main on Carey street between Lafayette avenue and Cumberland street, on Cumberland street between Pennsylvania avenue and Carey street, and on Pennsylvania avenue between Cumberland street and North avenue. Completed March 8. Length, 4,773 feet.

A twenty-inch main from the corner of York road and Twenty-fifth street; thence along Twenty-fifth street to Huntingdon avenue, to Thirtieth street, to Remington avenue, to First avenue, to Chestnut avenue, to Third avenue, to Falls road. Completed March 14. Length, $11,535\frac{10}{12}$ feet. This line was begun in the latter part of 1897.

Ten-inch lines on Druid avenue between Third and Union avenues and on Third avenue between Druid avenue and Falls road. Completed March 31. Length, 2,321 feet.

A ten-inch main on Chestnut avenue between First avenue and Singer. Completed April 18. Length, $271\frac{4}{12}$ feet.

A ten-inch main on Patterson Park avenue between Baltimore and Lombard streets, on Baltimore street between Patterson Park avenue and Chester, on Chester street between Baltimore and Fayette, and on Fayette street between Chester and Washington streets. Begun in 1897. Completed April 20. Length, 2,627 feet.

A ten-inch main on Reservoir street between Park avenue and Mount Royal Terrace. Length, 469 feet on Northern Central Railway grounds, north of Reservoir street. Length, 641 feet (bill rendered them). Completed September 29. Total length, 1,110 feet.

There has been completed the following lines on the new

UPPER SERVICE.

A twenty-inch main from the Western High-Service Reservoir, through Druid Hill Park to the Reisterstown road, to Druid Heights avenue, to Kate avenue. On March 7 the pipe line and connections were completed, except the connection with the stand-pipe. This latter connection was made June 18. This line was charged from the pumps at the Western Pumping Station June 29, and the residents of West Arlington were ready to be furnished with water July 2. Length of line, 14,079 feet.

A twenty-inch main on Garrison avenue between Kate avenue and Old Liberty road. Completed June 1. Length, 2,516 feet. (Rock blasting had to be resorted to on this line.)

A sixteen-inch main on Garrison avenue between Oakford and Kensinton avenues. Completed June 22. Length, 1,998 feet.

A sixteen-inch main on Garrison avenue and on the New Liberty road between the Old Liberty Turnpike and Chesapeake avenue. Completed August 31. Length, 4,538 feet. (Rock encountered.)

A twelve-inch main on the New Liberty road between Beech avenue and the Windsor Mill road, and a six-inch on the Windsor Mill road between the New Liberty road and Thirteenth street. Completed May 28.

A twelve-inch main on the New Liberty road between Chesapeake and Beech avenues. Completed September 9. Length of 12-inch, 1,069 feet; of 6-inch, 259 feet.

A twelve-inch main on Forest avenue between Liberty road and Oakfield avenue. Completed June 4. Length, 1,394 feet.

The residents of North Walbrook, west of Tenth street and north of Walbrook avenue, were transferred from the High Service to the Upper Service September 15.

Long six-inch lines were laid on the Middle Service as follows: Baltimore street between Patapsco and Curley. Completed April 13. Length, 1,147 feet. North avenue between Boone street and Kennedy avenue. Completed March 30. Length, 1,189 feet.

On the High Service: Mount street between Lafayette and Harlem avenues; completed March 26. Length, 912$\frac{8}{12}$ feet;

Bradish avenue south of North avenue, (rock blasting). Completed August 15. Length, 1,714 feet.

On the Upper Service: Belle avenue between Garrison and Lewin avenues. Completed September 28. Length, 1,236 feet; Ridgewood avenue between Eldorado and Garrison avenues. Completed June 22. Length, 1,259 feet.

There were one hundred and forty-nine fire plugs erected on new sites, making a total of 2,112 fire plugs January 1, 1899.

There were thirty-one new fire plugs erected on old sites to replace defective old-style ones.

Day and night pressures have been taken on all fire plugs.

Three new fountains were erected, located at Allen street, north of Fort avenue, Preston street, near Guilford avenue, Lafayette avenue and Payson street.

Three fountains were changed:

Paca and Barre was removed to Scott and Stockholm, Baltimore and Liberty to German and Liberty, Baltimore and Poppleton to Baltimore and Schroeder.

Two fountains were removed entirely:

Mount Royal avenue and McMechen street, in front of 210 Camden street.

There are in the city 212 public fountains.

The number of new service connections during the year was 3,217.

Of the above number of new service connections 774 were N. C. O. S., or new service replacing old ones on joint private pipes, these being put in at $6.00 each.

On September 1, a check valve was placed on the 20-inch West Arlington force line in Druid Hill Park, near Western High-Service Reservoir.

On October 25 an old 20-inch gate at North avenue and Oliver street was cut out and replaced with a new one for the McMechen street Middle-Service main.

The following miscellaneous work has been done during the year:

New Valves Placed.

New valves placed in mains at new sites	24
" " " " " " old "	61
" " used for repairs to mains	178
" " " " " " valves, hydrants and fountains	51
" " " " " " meter and service connections	198
" " " " extension of mains	952
" " " " service connections	6,440
" " " " valves, hydrants and fountains	27
" " " " metered supplies	60

Mains Repaired.

Broken mains repaired, 20 inches	6
" " " 10 "	3
" " " 6 "	5
" " " 4 "	28
" " " 3 "	34
" " " 2 "	19
Joint leaks caulked, 40 inches	2
" " " 36 "	43
" " " 30 "	17
" " " 24 "	1
" " " 20 "	44
" " " 16 "	38
" " " 12 "	35
" " " 10 "	138
" " " 8 "	13
" " " 6 "	264
" " " 4½ "	45
" " " 4 "	296
" " " 3 "	172
" " " 2 "	64
" " " 1½ "	19
Changing service from old to new mains	1
Mains cut off and capped	2
Mains lowered	11
Clogged mains relieved	12
Mains raised	3
Mains moved	3

Repairs to Fountains.

Changing location of fountains	3
Fountains repaired	165
Fountains removed, sites abandoned	2
Fountains turned on	209
Fountains turned off	209
Fountains turned off and on and repainted	209
Inspection of fountains	5,954

Repairs to Hydrants.

Fire hydrants capped and repaired	900
Clogged hydrants relieved	16
New upright to fire hydrant	1
Joints on hydrants recaulked	99
Location of fire hydrant changed	1

Repairs to Valves.

Stop valves packed and repaired	439
Street rims placed	67

Repairs to Services.

Joint leaks caulked	111
Ferrules drawn for leaks	176
Clogged service pipes and ferrules relieved	194
Service and private pipe leaks	436
Service leaks repaired	202
Abandoned ferrules drawn	27
"No leak" calls	516
Ferrule holes plugged	34
Service bills	230

MISCELLANEOUS.

Readings taken of pressures of fire hydrants	10,325
Ferrules drawn, order of Water Registrar	269
Ferrules returned, order of Water Registrar	103
Services turned off, order of Water Registrar	3,608
Services turned on, order of Water Registrar	2,654
Plumbing inspections	595
Inspection of plugs	288
Blow-off valves flushed	4,148
Flushing, reflushing and pumping out of 2,160 fire hydrants	47,369

FIRE PLUGS ERECTED ON NEW SITES.

S. W. corner Lanvale street and Hopkins avenue.
N. W. corner Oakford avenue and Garrison avenue.
S. W. corner Park Heights avenue and Old Pimlico road.
S. W. corner Park Heights avenue and Kate avenue.
North side Kate avenue 1,253 feet west of Park Heights avenue.
N. W. corner Twenty-seventh street and Hampden avenue.
N. E. corner Schroeder street and Baltimore street.
North side Kate avenue 332 feet west of Western Maryland Railroad.
N. E. corner Charles street and McComas street.
N. E. corner Charles street and Donalson street.
N. W. corner Charles street and Jephson street.
N. W. corner Schroeder street and Hollins street.
N. W. corner Kate avenue and First street, east of Garrison avenue.
N. W. corner Park Heights avenue and Second street, north of Old Pimlico road.
N. W. corner Jephson street and Hanover street.
N. E. corner Jephson street and Leadenhall street.
N. W. corner Hickory avenue and Third avenue.
N. W. corner North avenue and Oakhill avenue.
N. W. corner Northwest street and Mount street.
S. W. corner Fulton avenue and McHenry street.
N. E. corner Mount street and Harlem avenue.
N. W. corner Mount street and Lanvale street.
N. W. corner Cross street and Paca street.
North side Walbrook avenue 309 feet east of Payson street.
N. E. corner Chester street and Baltimore street.
N. W. corner Collington avenue and Baltimore street.
S. E. corner Wilkens avenue and Monroe street.
N. E. corner Carey street and Chappell street.
N. W. corner Baltimore street and Patuxent street.
N. W. corner Baltimore street and Chesapeake street.
N. E. corner McMechen street and Bolton street.
S. W. corner Druid avenue and Union avenue.
N. W. corner Third avenue and Union avenue.
North side Third avenue, opposite Division street.
N. W. corner Third avenue and Conduit avenue.
N. E. corner Carey street and Baker street.
S. E. corner Carey street and Cumberland street.
S. W. corner Cross street and Hanover street.
S. E. corner Wilkens avenue and Bentalou street.
N. W. corner North avenue and Cromwell street.
S. W. corner Wilkens avenue and Wilkens street.
N. W. corner Cross street and Parkin street.
S. W. corner Cross street and Carroll street.
N. W. corner Cross street and Scott street.
S. E. corner Wilkens avenue and Millington lane.
S. W. corner Pentland street and Girard avenue.
S. E. corner North avenue and Carey street.
N. W. corner Ridgewood avenue and Granada avenue.
N. W. corner Ridgewood avenue and Garrison avenue.
N. E. corner Forrest avenue and Springdale avenue.
N. E. corner Twenty-seventh street and Maryland avenue.

FIRE PLUGS ERECTED ON NEW SITES—Continued.

N. W. corner Roslyn avenue and Windsor Mill road.
East side Charles street 45 feet south of Wells street.
N. E. corner Forrest avenue and Oakfield avenue.
Corner Garrison avenue and Old Liberty road.
West side Garrison avenue 336 feet north of Liberty road.
West side Garrison avenue 793 feet north of Liberty road.
West side Garrison avenue 1,136 feet north of Liberty road.
West side Garrison avenue 1,587 feet north of Liberty road.
West side Garrison avenue 42 feet north of Belle avenue.
N. E. corner Forrest avenue and Ash avenue.
Garrison avenue and New Liberty road.
N. W. corner Luzerne street and Biddle street.
East side Chelsea avenue 411 feet north of Clifton avenue.
N. W. corner Madison street and Chester street.
North avenue east of Bradish avenue.
N. W. corner Constitution street and Biddle street.
Preston street opposite Collington avenue.
N. W. corner Preston street and Patterson Park avenue.
N. W. corner Preston street and Montford avenue.
N. W. corner Bradish avenue and Northwest street.
New Liberty road and Fairview avenue.
N. W. corner Columbia avenue and Bayard street.
N. W. corner Bradish avenue and Presbury street.
S. E. corner Bradish avenue and Baker street.
S. W. corner Whitelock avenue and Callow avenue.
New Liberty road, near Boulevard avenue.
N. E. corner New Liberty road and Chesapeake avenue.
S. W. corner Milton avenue and Oliver street.
N. W. corner Windsor avenue and Twelfth street.
N. W. corner Belle avenue and Lewin avenue.
N. W. corner Gunpowder street and Columbia avenue.
N. W. corner Elk street and Columbia avenue.
N. W. corner Monroe street and Columbia avenue.
N. W. corner Columbia avenue and Putnam street.
N. W. corner Columbia avenue and Manokin street.
N. W. corner Columbia avenue and Kent street.
N. W. corner Orleans street and Patapsco street.
N. W. corner Orleans street and Luzerne street.
N. W. corner Lafayette avenue and Fifth street.
N. E. corner Lorman street and Monroe street.
S. E. corner Montebello avenue and street south of Friendship lane.
N. W. corner North avenue and Washington street.
N. W. corner Riggs avenue and Monroe street.
Bloomingdale avenue and Liberty road.
Mount Royal avenue and Northern Central Railroad.
N. W. corner Twelfth street and Beech avenue.
N. E. corner Oxford avenue and Barclay street.
N. W. corner Elgin avenue and Twelfth street.
N. W. corner Mulberry street and Ogston street.
N. W. corner Huntingdon avenue and Twenty-ninth street.
N. W. corner Huntingdon avenue and Twenty-seventh street.
N. E. corner Huntingdon avenue and Twenty-fifth street.

FIRE PLUGS ERECTED ON NEW SITES—Continued.

S. W. corner Cross street and Race street.
N. W. corner Federal street and Patterson Park avenue.
S. W. corner North avenue and Second street.
N. W. corner Beech avenue and First avenue.
N. E. corner Main avenue and Oakfield avenue.
N. W. corner Stockholm street and Glyndon street.
N. E. corner Pennsylvania avenue and Ruskin avenue.
N. W. corner Mt. Royal Terrace and Reservoir street.
N. W. corner Washington street and Twenty-first street.
S. W. corner Presbury street and Second street.
N. W. corner Columbia avenue and Bush street.
Cheston avenue between Walbrook avenue and Clifton avenue.
N. W. corner Beech avenue and Ridge avenue.
N. W. corner Ridge avenue and Windsor Mill road.
S. E. corner James street and Stockholm street.
S. W. corner Lafayette avenue and Payson street.
N. W. corner Preston street and Luzerne street.
S. W. corner Concord street and Chase street.
S. W. corner Concord street and Eager street.
S. W. corner New Liberty road and Beech avenue.
S. W. corner New Liberty road and Elgin avenue.
N. W. corner Clark street and Ogston street.
S. E. corner St. Anne's avenue and Twenty-sixth street.
S. W. corner Fayette street and Luzerne street.
N. E. corner Holly, or Windsor, avenue and Seventeenth street.
S. W. corner Fait avenue and East avenue.
N. W. corner Lafayette avenue and Fifth street.
N. W. corner Mt. Royal Terrace and Lennox street.
N. W. corner Milton avenue and Federal street.
S. E. corner Centre street and North street.
N. W. corner Paca street and Little Paca street.
Howard street opposite Academy of Music.
S. E. corner Harford avenue and Oliver street.
N. W. corner Mulberry street and Gilmor street.
N. W. corner Divison street and Gold street.
N. W. corner Bolton street and Biddle street.
S. W. corner Gay street and Mott street.
N. W. corner Canton avenue and Albemarle street.
N. W. corner Biddle street and Collington avenue.
N. W. corner Biddle street and Patterson Park avenue.
N. W. corner Ramsay street and Poppleton street.
S. E. corner Aliceanna street and Central avenue.
S. E. corner Townsend street and Aiken street.
West side Fremont street near Patterson avenue.
S. E. corner Howard street and German street.
S. W. corner Howard street and German street.

FIRE PLUGS ERECTED ON OLD SITES.

S. W. corner Monument street and Wolfe street.
N. W. corner Saratoga street and Mitchell alley.
N. E. corner Baltimore street and Carey street.
N. W. corner Lafayette avenue and Jenkins alley.
N. E. corner Fairmount avenue and Chester street.
N. W. corner Caroline street and Canton avenue.
N. E. corner Argyle avenue and Smith street.
West side of Gay street between Montford avenue and Patterson Park avenue.
S. W. corner Riverside avenue and Hamburg street.
N. W. corner Pleasant street and Lovegrove alley.
S. E. corner Pratt street and Collington avenue.
N. W. corner Aliceanna street and Bond street.
N. E. corner Mount street and Lexington street.
N. W. corner Lafayette avenue and Stoddard alley.
N. E. corner Saratoga street and Mount street.
S. W. corner Lanvale street and Division street.
N. W. corner Pratt street and Bond street.
N. W. corner Central avenue and Madison street.
S. W. corner Baltimore street and Front street.
S. W. corner Light street and Ostend street.
N. W. corner Hanover street and Conway street.
N. E. corner Wolfe street and Eager street.
N. E. corner Riverside avenue and Folsom street.
S. E. corner Stricker street and Winchester street.
N. E. corner Frederick avenue and Wilkens street.
N. W. corner William street and Montgomery street.
S. W. corner Paca street and Cider alley.
N. E. corner President street and Canton avenue.
N. E. corner Dolphin street and Etting street.
N. E. corner Portland street and Emory street (Ludlow).
S. W. corner Fremont street and McHenry street (Ludlow).

The drive ferrule having been a source of considerable expense to the city on account of the plugs being forced out by the water pressure, the old style of drive ferrules were abandoned and screw corporation cocks were adopted. The Mueller tapping machine was also adopted to drill the hole and cut the thread for the screw corporation cock.

The obsolete method of drilling pipes for drive ferrules having been used since the department was started, the Board decided that we were fifty years behind the times, and to be up to date with the improvements and modern devices the Board adopted this device.

Very respectfully,

CHARLES KRAUSE,

Superintendent of Construction Division.

Report of Supervising Engineer Pumping Stations for the Year Ending December 31, 1898.

Maj. Wm. L. Kenly, Chief Engineer:

SIR:—I have the honor to submit yearly report of pumping stations, as follows:

EASTERN STATION.

Engine 1207 operated full 12 months, and Engine 839 operated only 11 months, delivering gallons of water as per report.

WESTERN STATION.

Engines 46 and 90 (old numbers being retained) were finished and placed in service June 21 and 28, respectively, as per report.

MT. ROYAL STATION.

Began receiving boilers and placing them in position early in October. They are now nearly ready for service. Engines began to arrive in November, when Mr. Worthington's representative came and commenced their reception and erection at once, so that now nearly all the heavy parts are together, and by fall they will be in shape to operate.

Respectfully submitted,

M. C. BARCLAY,
Supervising Engineer Pumping Station.

YEARLY REPORT 1898, EASTERN PUMPING STATION.

ENGINE NO. 839.

	Hours Worked.	Gallons Pumped.	Pounds Coal Consumed.	Duty.	Gallons Pumped per Coal Pound.	Cost.	Cost per 1,000 Gallons.
January	38	14,363,300	18,325	150,729,673	783	$57 84	.00392
February							
March	517	225,897,350	320,668	107,604,017	704	746 70	.00326
April	80	36,849,400	50,739	111,205,750	726	120 25	.00340
May	685	301,362,250	419,339	110,134,879	718	1,043 13	.00350
June	646	264,867,050	380,570	107,520,840	696	955 69	.00300
July	735	286,375,250	387,355	112,649,926	737	864 88	.00350
August	736	286,285,000	424,359	103,170,785	674	994 33	.00351
September	707	263,481,600	415,118	101,391,137	637	966 80	.00360
October	685	290,123,750	466,923	100,334,462	695	1,105 62	.00400
November	710	264,965,750	526,718	80,457,433	521	1,035 70	.00350
December	713	277,033,750	550,417	83,671,862	503	859 00	.00400
Totals	6,252	2,511,604,450	3,960,531	1,168,870,764	7,294	$8,749 94	.03893
Averages	521	209,300,371	330,045	97,405,897	608	729 16	.00322

YEARLY REPORT 1898, EASTERN PUMPING STATION.

Engine No. 1207.

	Hours Worked.	Gallons Pumped.	Pounds Coal Consumed.	Duty.	Gallons Pumped per Coal Pound.	Cost.	Cost per 1,000 Gallons.
January	673	251,054,218	306,688	125,586,222	812	$923 68	.00362
February	662	245,283,194	290,212	129,318,518	850	902 91	.00330
March	235	93,529,148	105,767	122,795,500	707	305 10	.00351
April	604	267,571,320	333,122	123,326,507	805	905 31	.00337
May	48	23,467,880	25,170	152,909,523	1,003	75 36	.00290
June	552	189,812,150	219,152	131,147,952	876	686 96	.00300
July	744	252,541,018	283,887	136,568,430	896	820 37	.00325
August	744	257,203,160	321,155	122,952,003	826	905 91	.00325
September	720	248,140,413	336,695	110,246,846	744	899 92	.00370
October	708	216,915,660	308,769	108,774,970	698	1,013 82	.00400
November	704	226,911,740	339,052	100,279,130	651	873 79	.00400
December	556	163,810,520	277,566	100,018,331	734	728 00	.00400
Totals	6,950	2,436,240,451	3,147,825	1,466,923,962	9,602	$9,041 13	.04190
Averages	579	203,020,038	262,319	122,243,662	800	753 22	.00350

YEARLY REPORT 1898, WESTERN PUMPING STATION.

ENGINE No. 46.

	Hours Worked.	Gallons Pumped.	Pounds Coal Consumed.	Duty.	Gallons Pumped per Coal Pounds.	Cost.	Cost per 1,000 Gallons.
January	Not in service.						
February							
March							
April							
May							
June							
July	54	9,693,334	29,117	46,614,280	396	$243 77	.0366
August	14	1,006,716	8,754	27,222,200	114	243 86	.0250
September	13	1,996,723	25,694	20,469,629	157	241 88	.0160
October	67	17,639,091	56,132	33,884,154	186	230 60	.0023
November	24	3,434,781	27,475	38,955,884	140	272 30	.0800
December	5¾	869,294	14,000	41,728,432	162	231 88	.0733
Totals	177	34,639,939	161,175	208,874,579	1,155	$1,464 29	.2332
Average	29	5,773,323	26,862	34,812,430	192	244 05	.0389

YEARLY REPORT 1898, WESTERN PUMPING STATION.

ENGINE No. 90.

	Hours Worked.	Gallons Pumped.	Pounds Coal Consumed.	Duty.	Gallons Pumped Per Coal Pound.	Cost.	Cost per 1,000 Gallons.
January	Not in service.						
February							
March							
April							
May							
June							
July	15	4,841,122	14,558	46,614,281	396	$243 77	.0333
August	14	1,006,718	8,754	27,222,202	114	243 87	.0250
September	7	1,128,314	9,430	20,469,629	133	241 88	.0160
October	49	3,826,525	50,130	33,884,155	187	230 60	.0023
November	18	2,122,616	16,275	38,955,884	140	272 30	.0800
December	6½	1,379,030	23,800	40,125,725	158	236 74	.0720
Totals	109½	14,304,325	122,947	207,271,873	1,128	$1,469 16	.2286
Averages	18¼	1,192,028	20,491	34,545,312	188	244 86	.0381

Report of Superintendent of Meter Division.

BALTIMORE, MD., January 1, 1899.

Major Wm. L. Kenly, Chief Engineer:

DEAR SIR: I beg to submit you herewith a report of work done in the Meter Division of the Water Department during the year 1898.

There were installed 84 meters of all sizes, consisting of 19 three-quarter-inch, 15 one-inch, 9 one-and-one-half-inch, 14 two-inch, 18 three-inch and 9 four-inch.

At the close of the year there were 1,290 meters and 405 indicators in service.

The meters were as follows: 18 five-eighths-inch, 338 three-quarter-inch, 243 one-inch, 133 one-and-one-half-inch, 205 two-inch, 337 three-inch, 15 four-inch and 1 six-inch.

The amount of revenue derived from meters during the year was $181,461.94.

Respectfully submitted,

F. G. SWEET, *Supt. Meter Division.*

Report of Engineer and Superintendent County Division for the Year Ending Decemher 31, 1898.

Maj. Wm. L. Kenly, Chief Engineer:

SIR:—The water in Lake Roland has been muddy only thirteen days during the year; it was very low during the summer, the lowest water recorded being on October 18, when it was 10.3 feet below the crest of the dam. No water passed over the dam between May 30 and August 14, and none between August 19 and November 23. A new steel fence was erected at the upper end of the lake along the Ruxton road. On December 4, during a very heavy gale, several trees were uprooted and fences leveled, the corn-house demolished and barn and shedding damaged; this has all been repaired and the property is now in its usual good condition.

The contract for dredging, which was let to the Baltimore Dredging Co. in the summer of 1897, was not signed until October 25 of the present year, the delay being caused by an injunction having been laid. Work was commenced in the latter part of November upon the construction of the plant, and is progressing satisfactorily, the dredge having been launched December 31.

Realized from the sale of hay, wood, sand, etc., $629.47.

The Jones' Falls conduit has continued in good working order, and has been attended with no unusual expense.

The rainfall on the Jones' Falls supply was 40.60 inches.

Hampden Reservoir continues in good order. There was an 8-inch drain laid along a portion of the southern boundary to carry off the water which had been draining upon the adjacent property.

As the hedge is now in good size I recommend that the old wire fence along the Falls road be removed. The keeper's house has been papered and the grounds kept in good order. About 1 A.M., July 24, H. Burke, "who with others was fishing," fell into the reservoir and was drowned. The body was recovered by John Van Horn and John Barnes at 4.35 A.M.

Druid Lake, the vault and lower stop house continue in good order.

The pumps in the Western Pumping Station have been remodeled so as to enable them to pump to the standpipe at West Arlington, the first water having been pumped in the force main June 28. There have been four breaks on this line between the pump house and W. H. Service Reservoir. The stack and building have been pointed, but the engine and boiler rooms need painting

The W. H. Service Reservoir is in good condition. A new screen has been placed in front of the screen well. While at work on this word was sent out to the reservoir that there was slack water on the H. S. Supply, and upon investigation it was found that leaves had accumulated over the screen in the well, which prevented the water from flowing from the reservoir. These were removed in a short time and the trouble was remedied.

The rainfall on the Gunpowder supply was 38.23 inches.

The water in Loch Raven was too muddy to use for seventy-five days. There has been a continuous flow over the dam, the maximum being 6 feet on July 19. The suits instituted against the department "below the dam" for dumping dredged material in the bed of the Falls have been compromised, and we now have permission to go ahead with the dredging. The only suits which have come to trial "above the dam" were those of the Jarrettsville turnpike and Mrs. Dymond. The Turnpike Company was awarded damages of $250, and Mrs. Dymond's case was compromised. The gate-house, dwellings and outbuildings have been painted, costing for labor $1,271.95, and material $262.08.

Realized from the sale of hay, corn, rye and rent, $284.81.

Lake Montebello remains in its usual good condition. Twice during the year the water became very muddy, which, on one

occasion, was caused by the water being turned on at Loch Raven before it had become clear, and on the other occasion by the keeper neglecting to close the gates at Lock Raven in time to prevent muddy water from getting into the conduit. The gate-house, dwellings and outbuildings have been painted and the dwelling of the Chief Engineer has been papered.

Realized from the sale of hay, $149.

Lake Clifton.—The gate-house, vault and pipe lines leading therefrom are in good order. The old screen in the gate-house has been replaced with a new one costing $1,906.50. The new 48-inch suction main for the Mount Royal Pumping Station has been connected with one of the idle 40-inch mains leading from this lake. A strip of land along a portion of the front of the keeper's lot has been exchanged for a piece in the rear of said lot, on which a stable is being erected. The maintenance of the roadways around the lake have been turned over to the Park Board, thereby relieving the department of that expense. About 600 feet of blind drain have been laid on property adjacent to the lake on the northeast side.

Guilford Reservoir.—The vault and adjoining ground are in good condition, and have been attended with no unusual expense.

Mount Royal Reservoir continues in good order.

For detailed statement of rainfall, flow of streams, waste, consumption, etc., see accompanying tables.

Respectfully submitted,

WM. BENTHALL,
Engineer and Superintendent County Division.

GUNPOWDER.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.
Clear water over dam, per month	2,863,581,330	2,597,421,192	2,370,063,665	2,534,300,043	1,780,500,820	911,588,355	3,192,903,042	2,181,822,417	1,305,131,224	1,585,239,634	988,305,752	2,074,324,148	24,385,181,622
Muddy water over dam, per month	1,772,310,480	675,685,453	502,001,470	375,901,734	1,698,307,284	286,217,051	2,043,582,744	4,974,034,091	621,409,911	564,340,631	1,519,545,126	2,940,372,801	17,973,708,776
Waste from Drain Gates, Loch Raven	3,272,866,168	2,375,850,705	3,365,235,264	3,413,617,083	5,585,628,936	2,480,491,105	2,408,392,435	1,710,248,610	1,834,969,843	1,406,890,178	3,156,734,478	3,630,906,944	37,641,831,779
Clear water through Conduit Gates	1,069,312,253	985,374,202	1,093,993,218	1,081,455,526	1,155,344,266	1,321,488,192	1,226,690,738	1,550,175,654	1,555,379,747	1,095,035,735	1,240,175,488	1,136,132,068	11,110,557,087
Total flow of stream, per month	8,978,070,231	6,634,331,552	7,331,293,617	7,405,274,386	10,219,781,306	4,999,784,703	8,871,568,959	13,416,280,802	4,916,890,725	4,651,506,178	6,901,760,844	9,781,735,961	94,111,279,264
Average flow of stream, per day	289,615,169	236,940,412	236,493,342	246,842,479	329,670,365	166,659,490	286,179,644	145,686,477	163,896,357	150,048,586	230,158,695	315,539,870	257,839,121
Spring water making into Conduit	93,000,000	84,000,000	93,000,000	90,000,000	93,000,000	90,000,000	93,000,000	93,000,000	90,000,000	93,000,000	90,000,000	93,000,000	1,095,000,000
Waste from Drain Gates, Lake Montebello	180,976,520	217,171,824	185,739,060	163,831,376	66,437,428	70,009,338	47,387,273	31,346,970	116,475,812	33,337,780	83,311,150	100,013,340	1,296,071,171
Waste over Weirs, Lake Montebello	51,172,155	16,991,779	71,048,190	49,725,037	24,098,648	36,483,206	28,571,197	9,073,659	46,651,296	23,369,195	59,120,961	13,263,254	189,868,577
Rainfall Lake Montebello, in inches	3.39	1.46	2.70	2.15	3.78	1.26	3.46	5.04	1.81	3.41	1.00	3.12	35.58
" " " " gallons	5,508,733	2,372,493	4,387,187	3,493,739	6,142,481	2,047,494	5,622,483	8,189,975	2,941,241	5,541,233	6,499,980	5,069,984	57,817,323
Gain or loss in Lake Montebello			— 25,339,922	+ 40,624,875			— 155,999,520	+ 84,499,740	— 136,499,580	+ 92,624,715	+ 29,219,910		
Water sent to Lake Clifton	935,372,311	807,583,092	959,933,377	917,274,238	1,163,950,671	1,307,043,142	1,405,354,271	1,526,445,260	1,221,693,470	1,100,952,253	1,164,960,147	1,231,202,052	13,744,764,284
Waste from Drain Gates, Lake Clifton	8,909,936				2,784,355								11,694,291
Waste over Weirs, Lake Clifton	80,245	83,290		1,923,953	55,536						55,536	20,826	2,219,386
Rainfall in Lake Clifton, in inches	3.51	2.06	2.69	2.12	3.91	.83	3.59	5.12	1.65	3.23	1.37	3.90	36.98
" " " " gallons	3,031,980	1,779,453	2,323,654	1,831,281	3,377,505	716,964	3,101,085	4,422,717	1,425,290	2,790,113	3,774,858	3,368,867	31,943,767
Gain or loss in Lake Clifton			— 15,548,616	+ 20,731,488		— 4,319,060	— 82,925,952	+ 38,871,540	— 66,513,524	+ 46,645,848	+ 15,548,616	+ 5,182,896	
Total sent to City, per month	929,411,110	809,279,255	977,805,647	896,450,078	1,164,488,285	1,312,079,166	1,491,381,308	1,491,996,437	1,289,632,284	1,057,096,518	1,153,130,853	1,232,367,198	13,865,121,139
Average sent to City, per day	29,981,100	28,902,831	31,219,537	29,881,669	37,564,138	43,735,972	48,109,074	48,128,917	42,987,743	34,099,888	38,437,695	39,753,781	37,822,249
Total waste, per month	8,150,196,834	5,913,204,243	6,494,087,649	6,539,299,226	9,157,813,007	3,784,789,055	7,720,836,691	11,906,525,777	3,921,638,086	3,613,177,418	5,807,106,303	8,788,901,313	81,800,575,602
Average waste, per day	262,909,575	211,185,866	209,486,698	217,976,641	295,413,323	126,159,635	249,059,248	384,081,477	130,821,270	116,554,110	193,570,210	283,512,946	224,111,166

Jones' Falls.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.
Clear water over dam per month	506,908,958	317,611,724	494,420,323	234,098,297	394,659,577			30,524,221			105,636,562	395,553,920	2,479,413,582
Muddy water over dam per month												209,608,493	209,608,493
Waste from D gates, Lake Roland			30,479,232	145,734,336	79,491,456			9,263,232				345,940,944	610,909,200
Clear water through conduit gates	102,075,660	351,960,000	389,670,000	395,244,335	417,473,784	399,511,498	540,498,389	371,930,220	415,481,388	429,838,562	317,375,832	279,577,400	4,710,637,068
Total flow of stream per month	908,984,618	669,571,724	914,569,555	775,076,968	891,624,817	324,570,874	460,000,000	536,717,673	265,481,388	429,838,562	523,012,394	1,230,680,757	7,930,129,330
Average flow of stream per day	29,322,084	23,913,276	29,502,244	25,835,899	28,762,091	10,819,029	14,838,710	17,313,473	8,849,376	13,865,760	17,133,746	39,699,379	21,726,382
Waste from Harper's waste weir													
Clear water sent to Hampden Reservoir	102,075,660	351,960,000	389,670,000	395,244,335	417,473,784	399,511,498	540,498,389	371,930,220	415,481,388	429,838,562	317,375,832	279,577,400	4,710,637,068
Rainfall in Hampden Reservoir, in inches	3.93	1.78	3.06	2.38	4.00	1.40	2.75	6.04	2.18	4.67	4.61	5.06	41.89
Rainfall in Hampden Reservoir, in gallons	852,299	386,028	663,622	516,151	867,480	303,618	596,393	1,309,895	472,776	1,012,783	1,006,277	1,097,362	9,084,684
Water sent to D Lake by gravity	103,795,439	352,346,028	390,333,622	395,760,486	418,883,439	399,815,116	542,396,002	372,155,765	417,689,124	430,851,345	315,562,799	282,172,852	4,721,762,017
Rainfall in D Lake, in inches	3.67	1.69	2.92	2.15	3.60	1.40	3.44	5.97	1.81	4.43	4.52	4.82	40.42
Rainfall in D Lake, in gallons	5,795,113	2,668,595	4,610,826	3,394,958	5,684,580	2,210,670	5,431,932	9,426,928	2,858,080	6,995,192	7,137,306	7,611,021	63,825,201
Waste from Druid Lake													
Gain or loss in D Lake	— 7,105,725	— 4,737,150	— 2,842,290	— 10,263,825	— 12,237,637	+ 7,895,250	— 7,895,250	+ 9,474,300			+ 48,950,550	+ 30,001,950	
Total sent to City per month	416,696,277	350,277,473	393,175,912	409,419,269	436,805,656	394,130,536	555,723,184	372,108,393	420,547,201	437,846,537	273,749,555	319,785,823	4,780,265,819
Average sent to City per day	13,441,170	12,509,910	12,683,094	13,647,309	14,090,505	13,137,684	17,926,554	12,003,500	14,018,240	14,124,082	9,124,985	10,315,672	13,096,619
Total waste per month	506,908,958	317,611,724	524,899,555	379,832,636	474,151,033			39,787,453			105,636,562	951,103,357	3,299,931,278
Average waste per day	16,351,902	11,343,276	16,932,244	12,661,088	15,295,195			1,283,466			3,521,215	30,680,753	9,040,908

Operation of Pumps.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Totals.
From W. P. Station to Upper Service							1,275,540	2,013,434	3,125,037	3,285,646	1,795,172	2,248,324	13,743,153
" " " " W. H. "							13,258,916			18,179,970	3,762,225		35,201,111
" Mt. R. P. Station to W. H. Service													
" E. " " " " "	230,457,518	219,063,194	218,176,498	254,925,720	299,370,130	332,305,500	363,166,508	386,139,410	363,488,493	150,799,410	332,803,690	336,344,270	3,817,040,341
" " " " " Middle "	34,960,000	26,220,000	71,250,000	19,495,000	25,160,000	122,373,700	175,749,760	157,348,750	148,133,550	56,240,000	159,073,800	104,500,000	1,130,801,560
" Mt. R. " " " " "													
High Service Reservoirs.													
Rainfall in High Service Reservoir in inches	3.67	1.69	2.92	2.15	3.60	1.40	3.44	5.97	1.81	1.43	1.52	1.82	40.42
" " " " " gallons	540,738	249,005	430,233	316,781	530,424	206,276	506,850	879,620	266,685	652,716	665,977	710,179	5,955,484
Gain or loss in High Service Reservoir	+ 1,399,730	+ 1,105,050	— 1,944,888	+ 2,504,780	— 2,652,120	— 5,598,920	+ 4,272,860	+ 3,388,820	— 2,652,120	+ 5,809,260	+ 1,031,380		
Rainfall in Guilford Reservoir in inches	3.40	1.40	2.99	2.21	3.84	1.22	3.29	5.12	1.53	1.00	3.80	2.40	35.20
" " " " " gallons	640,886	263,894	563,603	416,576	723,825	229,965	620,152	965,100	288,399	753,984	716,285	452,390	6,635,059
Gain or loss in Guilford Reservoir	659,736	— 1,413,720	— 6,785,856	— 753,984	— 659,736	+ 376,992	— 753,984	+ 1,319,472		+ 1,696,164	+ 2,073,456		
Recapitulation.													
Total Upper Service Consumption							1,275,540	2,013,434	3,125,037	3,285,646	1,795,172	2,248,324	13,743,153
" High " "	233,698,608	219,371,864	257,901,078	253,908,281	303,936,235	337,963,669	374,033,550	385,785,038	366,695,697	162,880,356	333,843,341	339,863,679	3,869,881,396
" Middle " "	451,656,277	376,497,473	464,425,912	458,914,269	474,503,293	516,504,236	731,472,944	529,457,143	565,555,717	472,620,921	132,823,355	122,037,499	5,896,469,039
" Low " "	663,996,592	563,996,061	658,379,149	592,029,358	839,658,155	857,399,966	952,465,040	948,508,277	778,010,241	550,057,108	661,253,363	791,522,928	8,857,276,238
" Consumption per month	1,349,351,477	1,159,865,398	1,380,706,139	1,304,851,908	1,618,097,683	1,711,867,871	2,059,247,074	1,865,763,892	1,713,386,692	1,488,844,031	1,429,715,231	1,555,672,430	18,637,369,826
Average " " day	13,527,467	11,423,764	14,539,553	13,495,064	52,196,699	57,062,262	66,427,325	60,185,932	57,112,889	18,027,227	47,657,174	50,182,981	51,061,287

BALTIMORE CITY WATER WORKS.

Table of Rainfall in Inches.

1898.	Jones' Falls Supply.			Gunpowder Supply.					
	Lake Roland.	Hampden Reservoir.	Druid Lake.	W. H. Ser. Reservoir.	Mt. Royal Reservoir.	Loch Raven.	Lake Montebello.	Lake Clifton.	Guilford Reservoir.
January	3.73	3.93	3.67	3.67	3.43	3.76	3.39	3.51	3.40
February	1.59	1.78	1.69	1.69	1.36	1.83	1.46	2.06	1.40
March	3.05	3.06	2.92	2.92	2.70	3.16	2.70	2.69	2.99
April	2.27	2.38	2.15	2.15	2.00	1.69	2.15	2.12	2.21
May	3.59	4.00	3.60	3.60	4.07	3.88	3.78	3.91	3.84
June	0.95	1.40	1.40	1.40	1.01	2.10	1.26	0.83	1.22
July	2.75	2.75	3.44	3.44	4.71	4.21	3.46	3.59	3.29
August	6.63	6.04	5.97	5.97	5.66	7.64	5.04	5.12	5.12
September	1.75	2.18	1.81	1.81	1.48	4.20	1.81	1.65	1.53
October	4.10	4.67	4.43	4.43	2.14	4.30	3.41	3.23	4.00
November	4.24	4.64	4.52	4.52	2.83	4.10	4.00	4.37	3.80
December	4.85	5.06	4.82	4.82	4.08	4.90	3.12	3.90	2.40
Totals	39.50	41.89	40.42	40.42	35.47	45.77	35.58	36.98	35.20

ANNUAL REPORT

OF THE TRUSTEES OF THE

McDONOGH FUND

JANUARY, 1899.

BOARD OF TRUSTEES

1898–99.

OFFICERS.

DAVID L. BARTLETT.....PRESIDENT.
GERMAN H. HUNT.....VICE PRESIDENT.
ROBERT H. SMITH.....SECRETARY.
DAVID L. BARTLETT.....TREASURER BARNUM AND TAGART BEQUESTS.

TRUSTEES.

DAVID L. BARTLETT.....205 East German street.
GERMAN H. HUNT.....Equitable Building.
ENOCH G. HIPSLEY.....Old Town Bank.
JULIAN LE ROY WHITE.....12 St. Paul street.
ROBERT H. SMITH.....622 Equitable Building.
E. STANLEY GARY.....108 West German street.
R. BRENT KEYSER.....205 East German street.

STANDING COMMITTEES.

E. S. GARY, R. B. KEYSER.....Finance.
G. H. HUNT, R. B. KEYSER.....Education.
G. H. HUNT, J. L. WHITE.....Barnum and Tagart Bequests.
G. H. HUNT, E. S. GARY.....Buildings.
R. H. SMITH, J. L. WHITE.....Legislation.
E. G. HIPSLEY, R. H. SMITH.....Farm and Lands.
G. H. HUNT, E. G. HIPSLEY.....Housekeeping and Supplies.

The President of the Board is chairman of each of the Standing Committees.

REPORT OF THE PRESIDENT.

OFFICE OF THE McDONOGH
EDUCATIONAL FUND AND INSTITUTE,
BALTIMORE, January 24, 1899.

To the Honorable,
the Mayor and City Council of Baltimore:

GENTLEMEN:

In making our Annual Report as required by ordinance, we have cause to be thankful for the general good health of the boys. There was at one time a number of pupils that had the general complaint of "la grippe," but fortunately it was in a mild form and they all soon recovered.

Dr. J. T. Edwards, who had been the Principal of the School for the past five years, resigned the position on account of failing health. This required the election of a successor. The Board of Trustees extended their sympathy to Dr. Edwards and family for the affliction that necessitated his resignation. There were many applicants for the vacancy; the Trustees, after due consideration, concluded to engage Professor S. T. Moreland, of The Washington and Lee University, of

Lexington, Virginia. Professor Moreland was a teacher at McDonogh School under Colonel Allan, the first Principal, and is conversant with its early organization and the methods of Colonel Allan, under whose management the School met with so great success. It was the desire of the Trustees that the methods then adopted should be continued.

Before the death of our lamented President, Samuel H. Tagart, after he had decided to make the McDonogh School his residuary legatee, he requested that a Memorial Chapel in his name should be erected for the use of the School. We commenced building this Chapel during the last summer, and it will soon be completed. It has a seating capacity for two hundred and fifty boys on the first floor, with a gallery over the porch that will seat fifty people. It is built of Port Deposit granite, and the inside finish is quartered oak, with an open roof, and stained glass windows. There is a bell tower, in which is a fine chime of ten bells, presented to the School, as a memorial, by Mr. German H. Hunt, one of our Trustees. The Trustees return their thanks for this beautiful contribution to the completeness of the Chapel.

The supply of water has been the cause of some anxiety to the Trustees. To reinforce the means that have been in use, an air motor, or wind mill, has been erected that will pump water night and day when there is sufficient wind, thus in a great measure doing away with the use of the steam pump, a rather expensive method.

For the purpose of propagation of early plants for the garden, the old Conservatory, which was beyond repair, has

been removed and a new and somewhat larger one erected in its place. The drought in the early summer caused a short supply of vegetables for the School, as well as short crops; still the farm has paid all expenses and shows a fair surplus to its credit. The farm has been well managed, much to the credit of the farmer, Mr. John Fringer. The teachers have been faithful in attending to their duties and the progress of the boys and the discipline of the School have been satisfactory.

The Matron had some anxiety when so many of the boys were confined to the house by "la grippe," but through the use of home remedies the sick were speedily relieved and there were no fatal cases.

Respectfully,

D. L. BARTLETT,

President.

REPORT OF THE FINANCE COMMITTEE.

BALTIMORE, *January 1, 1899.*

To the Trustees of the
McDonogh Educational Fund and Institute.

GENTLEMEN: The following is a statement of Receipts and Disbursements of the McDonogh Fund from January 1, 1898, to January 1, 1899.

RECEIPTS.

Cash on hand as shown by last report	$1,044 35
Interest on City Stock	38,046 00
Royalty from Stone Quarry	187 56
From the Treasurer of the Barnum Bequest	1,672 17
From Sales of Live Stock	150 00
From Sales of Farm Products	1,106 48
	$42,206 56

DISBURSEMENTS.

Insurance on buildings	$9 50	
Western Maryland Railroad Transportation, etc.	20 20	
Treasurer's Bond, premium	30 00	
Expenses of the Trust	442 81	
Additions to Farm Implements	400 00	
Additions to Garden and Orchard	249 21	
Payments on New Green House	962 07	
Trees and Shrubbery	610 91	
Amounts carried forward	$2,724 70	$42,206 56

Receipts brought forward			$42,206 56
Disbursements brought forward		$2,724 70	
For Expenses of Tuition	$7,232 75		
For Expenses of House and Lodging	6,109 00		
For Expenses of Subsistence	12,540 72		
For Expenses of Clothing	5,125 00		
For Construction and Repairs	2,220 24		
For Medical Attendance	262 37		
For Library and School Apparatus	319 62		
For Office Stationery	723 50		
For General Expenses	1,280 38		
		35,813 58	
For Barnum Wood Shops	1,020 01		
For Barnum Printing Office	652 16	1,672 17	40,210 45
Balance of Cash on hand			$1,996 11

INVESTMENTS.

The following statement shows how the McDonogh Fund is invested, and the present value of the Trust:

BALTIMORE CITY STOCK.

Funding Loan of 1900, interest at 6 per cent, payable January 1, April 1, July 1 and October 1	$85,200 00	
Jones' Falls Loan of 1900, interest at 5 per cent, payable Feb. 1, May 1, Aug. 1 and Nov. 1	30,000 00	
City Hall Loan of 1902, interest at 6 per cent, payable Jan. 1, April 1, July 1 and Oct. 1	1,800 00	
Western Maryland Loan of 1902, interest at 6 per cent, payable January 1 and July 1	1,500 00	
Funding Loan of 1916, interest at 5 per cent, payable May 1 and November 1	310,000 00	
McDonogh Extension Loan of 1916, interest at 5 per cent, payable March 1 and September 1	280,000 00	
Internal Improvement Loan of 1928, interest at 3½ per cent, payable January 1 and July 1	18,600 00	
Consolidated Loan of 1930, interest at 3½ per cent, payable January 1 and July 1	31,000 00	
		$758,100 00

Investment in Baltimore City Stock brought forward....		$758,100 00
REAL ESTATE.		
McDonogh Farm and Improvements.....	$127,500 00	
Payments on account of Real Estate in Louisiana.....	15,759 73	
School Buildings.....	174,605 17	
Barn, Stable, Wagon Shed, Water Supply, Silo.	11,067 03	
Gymnasium Building.....	31,203 66	
Cottages.....	6,444 68	
Green Houses.....	962 07	
		367,542 34
PERSONAL PROPERTY.		
Live Stock on McDonogh Farm.....	$5,400 00	
Household Furniture and Material.....	8,850 75	
Library, Furniture and Instruments.....	1,500 00	
Farm Implements.....	4,750 00	
		20,500 75
Amount of Cash on hand.....		1,996 11
		$1,148,139 20
Deduct amount due Tagart Bequest.....	$12,500 00	
Deduct amount due Barnum Bequest.....	5,080 00	17,580 00
Present Value of the Trust.....		$1,130,559 20

In addition to the real estate, stocks, etc., already enumerated, the Trust owns the following properties in the State of Louisiana:

LIVAUDAIS TRACT.

A one-half undivided interest with New Orleans to 177 arpents of land lying in the rear of the city of New Orleans, known as the Livaudais Tract.

ST. BERNARD AND ORLEANS PARISHES.

A small tract in the rear of Versailles, parishes of St. Bernard and Orleans, bought in by Baltimore under a judgment in its favor, at $280.

One hundred and eighty-five squares of ground in the rear of Versailles, parish of St. Bernard, sold in 1859 to W. Dunbar for $2,000, but not paid for.

NEW ORLEANS.

Twenty-four certain lots of ground situated in the city of New Orleans, in the square known as No. 370, bounded by Toulouse, White, Saint Peter and Duprez streets. This property was bought in by Baltimore at a tax sale, October 5, 1875, for $138.85, having been sold for payment of taxes due by J. O. Theard, a debtor of Baltimore. Assessed at $2,000.

BALANCE SHEET.

The books of account containing the various items embraced in the foregoing statements were duly balanced on 31st ultimo, and the Committee now present for your examination a Balance Sheet of the Trust Ledger, showing the investments of the Trust Funds on January 1st, 1899.

Dr.	BALANCE SHEET.		Cr.
Baltimore City Stocks.	$758,100 00	McDonogh Trust Fund.	$1,130,559 20
McDonogh Farm.....	127,500 00	Tagart Bequest.....	12,500 00
Real Estate, Louisiana	15,759 73	Barnum Bequest	5,080 00
School Building.....	174,605 17		
Barn, Stable, Silo, etc.	11,067 03		
Gymnasium Building.	31,203 66		
Five Cottages.....	6,444 68		
Live Stock on Farm..	5,400 00		
Household Furniture.	8,850 75		
Library and Instruments.....	1,500 00		
Farming Implements.	4,750 00		
Cash.....	1,996 11		
	$1,148,139 20		$1,148,139 20

Respectfully submitted,

DAVID L. BARTLETT,
GERMAN H. HUNT,
E STANLEY GARY,
Finance Committee.

STATE OF MARYLAND, City of Baltimore, sct:

I hereby certify that on this 11th day of January, A. D. 1899, personally appeared before me, a Justice of the Peace in and for the city and State aforesaid, David L. Bartlett, President of the Board of Trustees of the McDonogh Educational Fund and Institute, and German H. Hunt and E. Stanley Gary, two of the Trustees thereof, and did each make oath in due form of law, that the matters stated in the foregoing Reports are true, to the best of their knowledge and belief.

Sworn before THOMAS C. BAILEY,
Justice of the Peace.

THE ZENUS BARNUM BEQUEST.

BALTIMORE, *January 1, 1899.*

To the Trustees of the
McDonogh Educational Fund and Institute:

GENTLEMEN: The undersigned, Treasurer of the Fund created by the will of Zenus Barnum, deceased, hereby reports that the Receipts and Disbursements from January 1, 1898, to January 1, 1899, have been as follows:

RECEIPTS.

Ground Rent	$300 00
Dividends	197 20
Coupons paid	3,290 00
Interest on City Stock	1,470 00
Pittsburgh and Connellsville Railroad Bond, due July 1, 1898, $1,000, with coupon $35, sold for	1,054 50
	$6,311 70

DISBURSEMENTS.

Baltimore Trust and Guarantee Co., box rent	$15 00	
National Mechanics Bank, loan paid	1,207 05	
H. Sisson & Sons, marble curbstone and posts, and cleaning marble in Zenus Barnum lots	565 00	
Greenmount Cemetery, eight years care of lots and grading	61 25	
Gasoline engine and fittings	550 00	
Dynamo belt and machinery for shops	55 79	
Assessment on 25 shares B. & O. R. R. Preferred Stock	50 00	
U. S. Internal Revenue Stamps	4 72	
Paid Thomas A. Whelan, taxes	2 20	
Expenses of Wood Shops	$1,020 01	
Expenses of Printing Office	652 16	
	1,672 17	
		4,183 18
Balance of Cash on hand		$2,128 52

INVESTMENTS.

The following is a list of securities now held for the benefit of this Bequest:

Baltimore City Stock, 3½ per cent, 1930		$30,000 00
Baltimore City Stock, 6 per cent, 1900		7,000 00
Georgia, Carolina and Northern Railroad Bonds, 5 per cent, 1929		8,000 00
Virginia and Tennessee Railroad Bonds, 8 per cent, 1900		6,000 00
Georgia Pacific Railroad Bonds, 6 per cent, 1922		10,000 00
Ohio and Miss. R.R. Bonds, Springfield Div., 7 per cent, 1905		5,000 00
Louisville, Evansville and St. Louis Railroad Bonds, 1939, 5 per cent. (Defaulted in interest)		5,000 00
B. & O. R. R. Equipment Co. Bonds, 6 per cent, July 1, 1899.		5,000 00
Town of Salem, N. C., Bonds, 5 per cent, 1931		5,000 00
Western Maryland Railroad Bonds, guaranteed, 6 per cent, 1900		3,000 00
Northern Central Railroad Bonds, 6 per cent, 1900		3,000 00
Southern Railroad Bonds, 5 per cent, 1994		2,000 00
Ga. & Ala. R. R. 1st Mortgage Preference Bonds, 5 per cent, 1945		4,000 00
Central Railway Extension and Improvement Bonds, 5 per cent, 1932		5,000 00
		98,000 00
Maryland Fire Insurance Co., 80 shares, par $5	$400 00	
Baltimore and Ohio Prf'd, 25 shares, par $100	2,500 00	
Firemen's Insurance Company, Baltimore, 60 shares, par $18	1,080 00	
Girard Fire Insurance Company, Philadelphia, 6 shares, par $100	600 00	
Southern Railway Co., Prf'd, 4 shares, par $100	400 00	
		4,980 00
McDonogh Trustees, Loan		5,080 00
		$108,060 00

In addition to the stocks and bonds above enumerated the Trust owns a sub-groundrent on property on Fort avenue, Baltimore, yielding $300 per annum.

Respectfully,

D. L. BARTLETT,
Treasurer.

THE SAMUEL H. TAGART BEQUEST.

BALTIMORE, *January 1, 1899.*

To the Trustees of the
McDonogh Educational Fund and Institute:

GENTLEMEN: The undersigned, Treasurer of the Fund created by the will of Samuel H. Tagart, deceased, hereby reports that the Receipts and Disbursements from January 1, 1898, to January 1, 1899, have been as follows:

RECEIPTS.

Cash on hand as shown by last report	$6,633 64
Dividend from Academy of Music	66 66
Interest on mortgages	1,688 33
Coupons paid	5,320 00
Ground Rents collected	2,596 45
Interest from Baltimore Trust and Guarantee Company	169 63
Sale of Leasehold, No. 421 Courtland street, less ground rent, taxes and expenses	87 27
Rebate of Insurance Premium from Maryland Fire Insurance Company	3 75
Mortgage note, of C. T. & A. C. Bowen, paid	8,000 00
Baltimore Trust and Guarantee Company, withdrawn	6,000 00
Brush Electric Company Bonds, $5,500, surrendered to the Company for cash	2,818 75
	$33,384 48

DISBURSEMENTS.

Box rent, Baltimore Trust and Guarantee Co	$25 00	
Annuity to Sally Hathaway	150 00	
Grount rent to Louisa C. Taylor	69 00	
Keeping graves of Samuel H. Tagart and Col. Wm. Allan in condition and leveling lot	27 50	
Removing remains of Col. Allan from St. Thomas's churchyard	25 00	
Opening graves and grading	32 50	
Amounts carried forward	$329 00	$33,384 48

Receipts brought forward		$33,384 48
Disbursements brought forward	$329 00	
Western Maryland Railroad Transportation	4 38	
Temporary Loan	87 00	
U. S. Internal Revenue Stamps	4 16	
Fees in foreclosure of mortgage on property No. 2502 St. Paul street	294 08	
Court costs in suit vs. Lemuel German	9 70	
Exchanging $5,000 Manchester and Augusta Railroad bonds for $6,000 Atlantic Coast Line bonds	50 00	
Payments on account of Organ, Tagart Memorial Chapel	1,000 00	
Payments on account Tagart Memorial Chapel	15,232 08	
Bought $5,000 Georgia Southern and Florida Railroad First Mortgage 5 per cent bonds	5,075 00	
Bought $8,000 Southern Railway First Mortgage Consolidated 5 per cent. bonds	8,220 00	
Baltimore Trust and Guarantee Co., deposit	169 63	
		30,475 03
Balance of Cash on hand		$2,909 45

INVESTMENTS.

The following is a list of securities now held for the benefit of this Bequest:

BONDS.

City of Cumberland, Md., 5 per cent, 1922	$9,000 00
City of Bristol, Tenn., 6 per cent, 1922	5,000 00
City of Atlanta, Ga., 4½ per cent, 1922	10,000 00
City of Savannah, Ga., 5 per cent, 1909	5,000 00
Town of Salem, N. C., 5 per cent, 1931	10,000 00
Baltimore Traction Company, 6 per cent, 1901	10,000 00
Baltimore City Passenger Railway Company, 5 per cent, 1911	5,000 00
City and Suburban Railway Company, 5 per cent, 1922	5,000 00
Chattanooga Electric Railway Company, 6 per cent, 1909	5,000 00
Consolidated Gas Company, 6 per cent, 1910	500 00
Southern Railway Company, 5 per cent, 1994	9,000 00
Richmond and Manchester Railway Company, 5 per cent, 1933	7,000 00
Bonds carried forward	$80,500 00

Bonds brought forward		$80,500 00
Baltimore and Ohio Equipment Company, 6 per cent, 1899.		2,000 00
Lake Roland Elevated Railway Company, 5 per cent, 1942..		6,000 00
Georgia Southern and Florida Railway Co., 5 per ct., 1945.		5,000 00
Atlantic Coast Line Railroad Co. of S. C., 4 per cent, 1948..		6,000 00
		$99,500 00

CASH.

Deposit in Bank	$2,909 45	
Deposit in Baltimore Trust and Guarantee Co ...	4,312 24	
		7,221 69

BILLS RECEIVABLE.

C. J. Moore, on mortgage at 5 per cent, interest payable January 2 and July 2	$17,600 00	
C. T. & A. C. Bowen, on mortgage at 5 per cent, interest payable April 18 and October 18	8,000 00	
McDonogh Trust Fund	12,500 00	
		38,100 00
		$144,821 69

COTTAGE.

New Cottage for Teacher, $2,941.65.

TAGART MEMORIAL CHAPEL.

Present cost, $15,232.08.

FEE-SIMPLE PROPERTY.

House No. 2502 St. Paul Street, $5,400.

GROUND RENTS.

On 40 pieces of property, $2,828.06, capitalized at 5 per ct., $56,561.20.

BRUSH ELECTRIC LIGHT COMPANY.

5.45 Shares Common Stock, par $100.

ACADEMY OF MUSIC STOCK.

1½ Shares, par $1,000.

ATLANTIC COAST LINE R. R. CO. OF S. C.

3 Shares Common Stock, par $100.

PERPETUAL POLICY OF INSURANCE.

In Baltimore Equitable Society, $125.

Respectfully,

D. L. BARTLETT,
Treasurer.

SECOND REPORT

OF THE

SEWERAGE COMMISSION

OF THE

CITY OF BALTIMORE,

CONSISTING OF

MENDES COHEN,

F. H. HAMBLETON,

E. L. BARTLETT.

APPOINTED BY JOINT RESOLUTION OF THE CITY COUNCIL
APPROVED 25TH MAY, 1893,

AND CONTINUED BY JOINT RESOLUTION APPROVED 18TH MARCH, 1898.

BALTIMORE,
1899.

PRESS OF
J. W. BOND COMPANY,
BALTIMORE, MD.

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REPORT

OF THE

SEWERAGE COMMISSION.

To the Honorable,

The Mayor and City Council of Baltimore:

The Sewerage Commission has the honor to submit a further report in accordance with the duty assigned to it under the following joint resolution:

"*Whereas*, It appears that the recommendation made by the Sewerage Commission in its report, dated September 20, 1897, that the disposal of the city's sewage be by discharge into the Chesapeake Bay, causes apprehension that the waters of the bay may be thereby polluted and the oyster interests be thus affected unfavorably;

"*Resolved by the Mayor and City Council of Baltimore*, That the Sewerage Commission be and it is hereby authorized and directed to make further investigation and report what is, in their judgment, the best alternative plan which, whilst proving effective in the disposal of the sewage, will serve to relieve all public apprehension of pollution to the waters of the Chesapeake Bay."

"Approved March 18, 1898."

"WM. T. MALSTER, *Mayor*."

As directed by this resolution, the Commission has reconsidered the recommendations of its report, submitted under date of September 20, 1897, and has carefully revised

the estimates therein made. It finds no reason to abate its confidence in the conclusions and recommendations of that report, and reiterates its belief that the true and most economical method of disposal of the domestic sewage of the City of Baltimore is by discharge into the Chesapeake Bay at a distance from the western shore of from one to two miles, where, remote from any usable oyster beds, it will be diluted, diffused and oxidized by the enormous discharge of the Susquehanna River, and will be practically destroyed without causing offense anywhere along the shores of the bay and without affecting deleteriously either the oyster itself or the commercial interests concerned therewith.

The existing storm-water drains, freed from the pollution of domestic sewage and cess-pool overflows, will empty, as now, into Jones' Falls and the harbor, carrying nothing but street washings and leaving the basin free from most of the putrefying organic matter which is the great cause of its offensive condition now so generally and justly complained of.

The waters of the bay, which already dispose of the sewage from the larger towns and cities along the shores of the Susquehanna River and its tributaries, with population now aggregating upwards of 700,000, and also those of the Patuxent, Potomac, Rappahannock, York, James and Elizabeth Rivers, with a population now reaching 500,000, not mentioning those of less important tributaries on the eastern shore of the bay, will really receive, by reason of such discharge, little more than is already carried there, other than what will be due to the further growth of the city; for the present foulness of the Patapsco finds its way there sooner or later. The dredgings of our basin and Jones' Falls, loaded into scows, are now dumped there, and much, even of the night soil of the city, when removed and distributed upon farm lands along the shores of the Patapsco or its tributaries, soon reaches the bay through the action of rainfall.

POLLUTION OF OYSTERS.

Whilst it has been very clearly established, as well in this country as in England and in France, that oysters exposed to sewage contamination may breed disease when eaten uncooked, yet so far as we have been able to ascertain, such effect has only been found where oysters have been planted in, or transplanted to, in-shore localities for development or fattening, or for convenience of storage near market, and have there been directly exposed to the sewage outfall of more or less populous districts. The only records of such effects which have reached us have been due to exposures within short distance of the outlet of pollution, and we have the expressed opinion of investigators against the probability of any such risk with increasing distance.*

Sir Richard Thorne Thorne, M.D., F.R.S., a high authority, says, speaking of layings, fattening beds or storage ponds round the English coast, "But as regards the majority of them any such polluting matter becomes mixed with so vast a bulk of water that it is difficult to see how the layings can be subjected to anything approaching substantial risk of deleterious influence."

Again—"So also the dilution of the sewage is * * * at times, indeed, so considerable that the chances of sewage contamination hardly call for notice."†

Dr. H. Timbrell Bulstrode says, speaking of the exposure of the Mumbles oysters on Swansea Bay, "The sewage of Swansea finds its way into Swansea Bay some three or four miles distant from the layings. The amount of dilution which Swansea sewage must undergo in crossing the bay, if as a matter of fact it can cross it, must needs be so great

*Report of Sewerage Commission, September 20, 1897, pp. 53 et seq.; also Report of Dr. G. S. Buchanan to the Local Government Board, (England and Wales,) February 19, 1898.

†Sir Richard Thorne Thorne, M.D., Report to the Local Government Board, (England and Wales,) on Oyster Culture in Relation to Disease, October, 1896, pp. ix., xiii.

as to render a consideration of it in relation to the Mumbles oyster beds unnecessary."*

Again, in speaking of the oyster fisheries of the River Medway, he says: "The oyster layings in the Medway are situated in positions quite remote from habitations, in fact in positions which are by land very difficult of access. * * * As regards these layings it must, I think, be held that they are largely protected by their position and the enormous volume of water in the Medway."

Further, the same investigator says: "Obviously it is possible to reduce to an absurdity the demand for absolute freedom of food supplies from such risks, and to regard, for instance, all articles of food exposed to the ordinary atmospheric conditions of towns as liable to specific contamination, more especially if regard be had to the somewhat cosmopolitan distribution of *bacillus coli*. As regards oysters it would not be difficult to argue that even the deep-sea oyster beds may, in theory, not be entirely free from risk of dangerous contamination."

CHARACTERISTICS OF THE CHESAPEAKE BAY.

The Chesapeake Bay, into which this Commission has proposed and still recommends to discharge the sewage of the city, amounting in the somewhat distant future to a maximum daily flow of 126 million gallons or 194 cubic feet per second, covers an area of some 2,500 square miles, exclusive of lateral estuaries, and has a total length of about 190 miles from the mouth of the Susquehanna River to the sea. The point recommended for the discharge of the sewage of Baltimore is distant about 30 miles from the head of the bay and is some 160 miles from the sea. It is designated on the accompanying map of the bay, Plate I, by the point marked K. The depth increases from the shores to a maximum in the channels of 75 feet at the upper end, and to 215 feet before the southern line of Maryland is reached.

*Report to the Local Government Board, October, 1896, pp. 55, 81, 82.

SEWERAGE COMMISSION OF THE CITY OF BALTIMORE MAP OF CHESAPEAKE BAY

1899

THE DOT IN CENTER REPRESENTS AREA OF ONE DAY'S SEWAGE FROM ONE MILLION POPULATION DISCHARGED AT K

V

AREA OF ONE WEEK'S SEWAGE — W

X — AREA OF ONE MONTH'S SEWAGE

SCALE
MILES
KILOMETRES

Y — AREA OF DAILY DRY WEATHER DISCHARGE OF FRESH WATER PASSING FROM ABOVE POINT K

Z — AREA OF MEAN DAILY DISCHARGE OF FRESH WATER PASSING FROM ABOVE POINT K

SCALE OF DIAGRAM IDENTICAL WITH THAT OF MAP WITH AN ASSUMED UNIFORM DEPTH OF 20 FEET

PROPORTIONATE VOLUMES

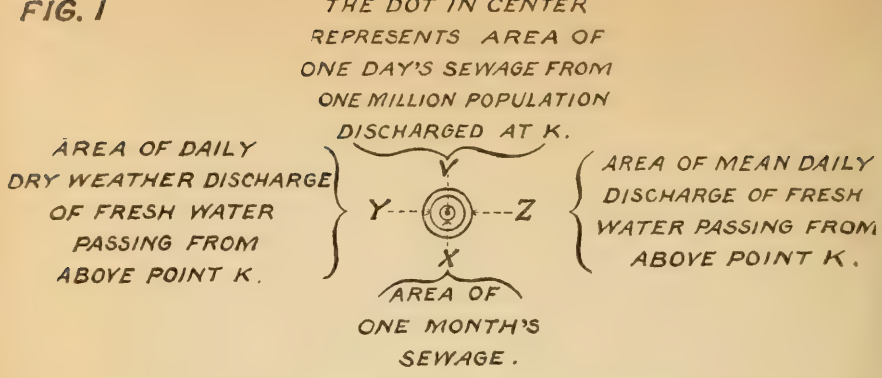
V	1
W	7
X	30
Y	133
Z	266

NOTE - K DENOTES LOCATION OF OUTLET IN BAY — PROJECT I

SEWERAGE COMMISSION | MENDES COHEN, F.B. HAMBLETON, E.L. BARTLETT

Plate I

FIG. 1

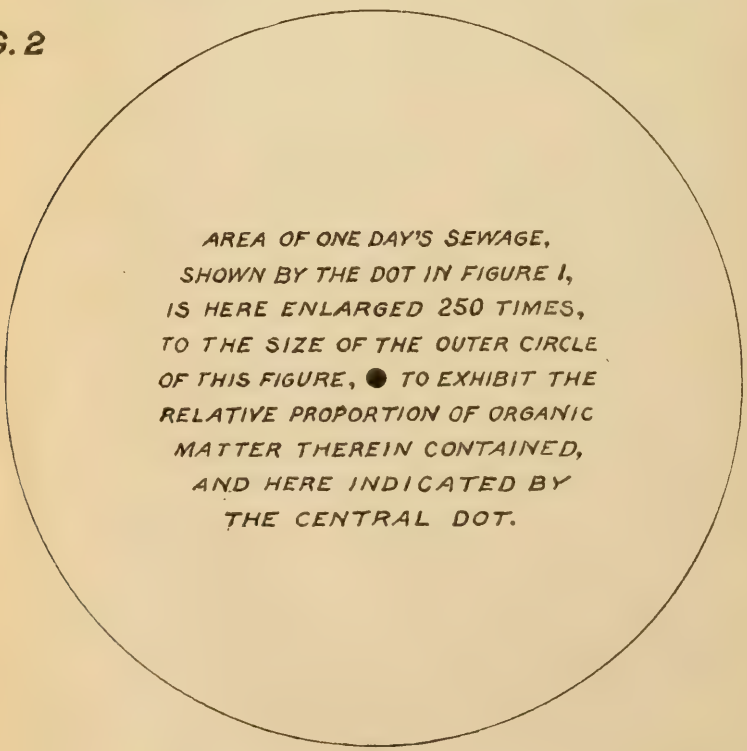

THE DOT IN CENTER REPRESENTS AREA OF ONE DAY'S SEWAGE FROM ONE MILLION POPULATION DISCHARGED AT K.
AREA OF DAILY DRY WEATHER DISCHARGE OF FRESH WATER PASSING FROM ABOVE POINT K.
V
Y
Z
X
AREA OF MEAN DAILY DISCHARGE OF FRESH WATER PASSING FROM ABOVE POINT K.
AREA OF ONE MONTH'S SEWAGE.

PROPORTIONATE AREAS WITH EQUAL DEPTH OF 20 FEET

V	•	1
X	○	30
Y	◯	133
Z	◯	266

SCALE $\frac{1}{800,000}$ OR SAME AS THAT OF PLATE I.

FIG. 2


AREA OF ONE DAY'S SEWAGE, SHOWN BY THE DOT IN FIGURE I, IS HERE ENLARGED 250 TIMES, TO THE SIZE OF THE OUTER CIRCLE OF THIS FIGURE, ● TO EXHIBIT THE RELATIVE PROPORTION OF ORGANIC MATTER THEREIN CONTAINED, AND HERE INDICATED BY THE CENTRAL DOT.

SCALE $\frac{1}{3200}$; 250 TIMES THAT OF PLATE I.

At its upper end it receives the outpour from the Susquehanna River, the dry weather flow of which has been variously estimated between 15,000 cubic feet and 35,000 cubic feet per second. Lower down there is added to its waters the discharge from innumerable tributaries, great and small, giving an additional volume of fresh water, which may be estimated at 41,000 cubic feet per second, mean dry-weather flow.

It may thus be seen that the Chesapeake Bay is not a stagnant pool without current adequate to protect and purify itself from defilement of any sort, nor a mere arm of the sea depending entirely for such purification on the agitation of its waters by the tides; but is in reality a great estuary with a tributary water-shed of some 71,000 square miles, receiving a constant accession of fresh water at an average rate throughout the year of approximately 132,000 cubic feet per second. Of this fresh water rather more than two-fifths is received at the upper end of the bay and above the point where it is proposed to discharge the sewage of Baltimore.

If to this volume of fresh water there be compared the output of sewage, which in the future may attain to as much as 194 cubic feet per second and of which less than one-thousandth part consists of organic matter, the ratio is found to be so small that the idea of contamination or defilement of the waters of the bay thereby seems to have slight foundation.

The diagrams, figures 1 and 2, show by inspection the relative volumes under consideration.

TYPHOID INFECTION.

It must, however, be borne in mind that it is not from the sewage itself that detriment to the oyster is apprehended. All fish life in the waters of the bay is dependent for its support upon the organic matter suspended in its waters. This it takes up, digests and assimilates. The alleged ground for apprehension is found in the possi-

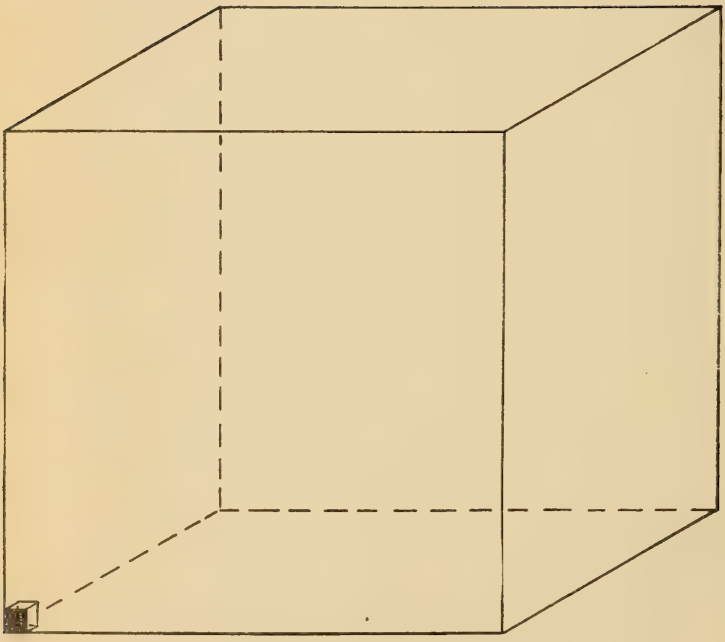
bility that the typhoid bacillus, discharged from the bowels of a patient in the city, may survive not only the long voyage through the sewers for some 15 miles to the deep waters of the bay, but, still living, may continue its voyage till it happens to strike an oyster bed, although there are now none within several miles of the proposed point of sewage outfall. If the bacillus is taken in by the mouth of an oyster, that probably ends its possibilty for evil; for we have authority for the statement that the typhoid bacillus does not develop and increase in the stomach or tissues of the oyster, but is digested by it, and soon disappears, leaving no trace.

The chance remains, however, that the bacillus may lodge *on* an oyster and not be taken into its stomach. This oyster may be dredged with thousands of others, and be conveyed to market. Here, instead of being "processed" by heat and packed in cans or otherwise for other and distant markets, it may happen to be eaten raw. Now comes the only chance of trouble. If this bacillus, still surviving all the knocking about it has had since it left its birth-place and habitat in a human intestine in Baltimore many days before, should happen to be caught on the oyster knife and delivered with the oyster to an individual, whose stomach is out of condition and only waiting to be attacked, then, and only then, we have the catastrophe—a case of typhoid fever.

It may be well here to quote an extract or two from a paper recently read before the Sanitary Congress at Birmingham, England, by Samuel Rideal, D. Sc., F. I. C., of London, England, (a gentleman to whom your Commission is indebted for other valuable information). He says:

"A question frequently raised is the possibility of an effluent conveying disease germs. By this time it is well known that fortunately pathogenic bacteria as a rule do not thrive much below blood heat, and that they are rapidly crowded out and destroyed by the ordinary bacteria existing in common waters, and still more by the immense

FIG. 3



THE LARGER CUBE REPRESENTS THE VOLUME OF SEWAGE FROM THE ENTIRE POPULATION OF THE CITY.

THE SMALLER CUBE REPRESENTS THAT DERIVED FROM THE FULL NUMBER OF TYPHOID PATIENTS WITH SAME PROPORTION OF TYPHOID CASES TO POPULATION AS EXISTED IN 1897.

numbers present in sewage. I need hardly refer to the fact that the typhoid bacillus has only in rare cases been found even in waters and sewages to which it must obviously have penetrated. This disappearance is clearly explained by some experiments of Dr. Sims Woodhead at Exeter, when he found that crude sewages containing about half a million organisms per cubic centimetre when inoculated into the filtered effluent of a septic tank developed more than one thousand millions in five days, thus overwhelming any pathogenic bacteria that might be present. In the same Local Government Board inquiry Dr. Pickard specially investigated the typhoid microbe with reference to the action of crude sewage on it and to the effect of a filter bed on those germs which had survived a short exposure. He concluded that the sewage itself, even when sterilized, 'was not only a bad food, but an actual poison' to these bacteria; that in the septic tank they suffered a rapid destruction, and that the filter beds effect a further biological elimination, 'so that there is no chance whatever of the filtered effluent causing typhoid fever if passed into the river.'"

The Health Commissioner of Baltimore reported 362 cases of typhoid fever in Baltimore in 1897, very nearly one case for every day in the year.

The average duration of each case that recovers is estimated at 60 days, including the period of incubation, so that we may assume there were existing every day 60 cases of the disease in various stages.

Now, if we estimate that 100 gallons of water per day are used by each one of the sick, we have 6,000 gallons daily as liable to contain germs of this disease out of some 69⅓ millions of gallons, the estimated future flow of sewage from a population equal to that of 1897. That is about 95 hogsheads of sewage liable to contain germs of typhoid out of 1⅛ millions of such hogsheads daily discharged into the bay.

This proportion is shown graphically by diagram, figure 3

It is claimed, and we believe, that if proper attention be paid to the protection of our present water supply, and care be taken to inspect the sources whence milk is furnished to the city, there will be a marked reduction in the present typhoid rate. When, in addition, we have a properly constructed sewerage system, whereby cess-pools, no longer a necessity, will be in fact absolutely prohibited, we shall be rid of one of the readiest facilities for the conveyance of disease.

Excrementitious matter generally need never then be exposed to flies, which now pass freely from our present out-buildings or privies directly to the adjacent kitchens, where their contact with food means immediate pollution. That these insects are a potent means of disseminating disease does not admit of doubt.

In an address delivered before the Maryland Public Health Association in February, 1897, Dr. William Osler, F.R.S., of the Medical Faculty of Johns Hopkins University, remarked: "We may *confidently* expect, with the completion of a good sewerage system, the present (typhoid) death rate of Baltimore, about 40 per 100,000, to fall to that of the cities of the first class, from 4 to 8 per 100,000 inhabitants."

Surely with such conditions of improvement there need be little fear that an oyster reposing on its distant bed will suffer injury by contact with a wandering bacillus from one of the very small number of typhoid victims which may possibly still be found within our then carefully guarded city.

It would appear to be equally unreasonable to apprehend that the organisms of disease contained in the sewage can survive such dilution and dispersion and remain a menace of any importance to the oysters, there being at present no workable beds of merchantable oysters within several miles of the outlet heretofore recommended.

As it has been thought possible that oyster beds may in the future develop around the point of proposed outfall,

it may be deemed the part of prudence to prohibit by law the taking of oysters for market within a distance of say four miles in all directions from such point. Should oysters hereafter be found there they need not be lost to commerce, but may be used under special license for transplanting to other localities, there being ample authority for the assertion that oysters exposed to and even inocculated with typhoid germs become freed from such germs in from one to three weeks after being transferred to a stream of clean sea water.*

With such provision there would be no more exposure of marketable oysters to disease germs than already exists and probably always will exist, for the oysters are now mainly taken from the more shallow waters along the shore and largely from the lateral estuaries, where they are surely more exposed to chances of defilement from the sewage of the cities and towns located on the banks of the several tributaries of the bay than will be the deep water oysters, or those of the bay generally, from the sewage of Baltimore.

An important consideration in favor of a discharge of the sewage into the bay not hitherto mentioned, is that with a gravity outfall the city provides itself with what may be regarded as a great safety outlet, less liable to be interfered with by accidents to machinery than is the case with other methods of disposal more dependent on pumping for removing the sewage as fast as collected.

However, if our fellow-citizens are not inclined to avail of this, the natural and most economical method of disposal, and should determine to have something else, leav-

* Proceedings of the Académie de Médicine of Paris, quoted in Appendix 4, Twenty-fourth Annual Report of the British Local Government Board for 1894–'95 on Oyster Culture in Relation to Disease, p. 174.

Report by Dr. Klein on his Bacteriological Researches in Appendix 2, Twenty-fourth Annual Report of the British Local Government Board for 1894–'95 on Oyster Culture in Relation to Disease, p. 120.

A paper by Professors W. A. Herdman, F. R. S., and Robert Boyce, read before the Royal Society January 19, 1899, and quoted in "Nature," vol. 59, p. 306.

ing the economies of the dilution method to be enjoyed by our neighbors, whilst we make use of some much more expensive system, nothing remains for your Commission, under its instructions, than to point out such other method as seems to it available, though it be much more costly to construct and operate.

ALTERNATIVE PLANS.

In the report of this Commission made September 20, 1897, there were summarized three methods of disposal:

First. By dilution into the waters of the bay.

Second. By chemical precipitation of the solids and disposal of the effluent into the river or bay.

Third. . By filtration upon lands in Anne Arundel County.

Of these the second was eliminated as offering no advantages when either the first or third could be made to serve efficiently the desired end, unless indeed as a temporary expedient, etc. The first and third methods were then discussed and their cost compared, with the resulting conclusion of the Commission to recommend the first.

In place of this, the Commission, under its instructions, might have been expected to recur to the third method, or filtration upon land, as the only alternative plan. However, since the publication of the report already referred to, there have been developed certain bacteriolytic processes of sewage treatment, which are now receiving much attention, particularly in England. For some of these great efficiency is claimed, and your Commission has deemed it proper to investigate these methods, to ascertain if by their aid the necessity for carrying the sewage to the agricultural filtratration fields can be avoided, and its purification effected in a degree sufficient to admit of its discharge into the Patapsco River at a point nearer to the city than hitherto deemed admissible, involving at the same time less outlay for construction and annual maintenance.

SEWERAGE COMMISSION
OF THE
CITY OF BALTIMORE
MAP SHOWING
PROPOSED LOCATIONS OF OUTFALL SEWERS

BASED UPON MAPS OF THE U.S. GEOLOGICAL SURVEY

1898

Scale of Miles

0 ½ 1 2 3 4

PROPOSED OUTFALL SEWER

PROPOSED MIDDLE BRANCH OUTFALL SEWER

PROPOSED CURTIS BAY OUTFALL SEWER

PROPOSED MARLEY OUTFALL SEWER

PROPOSED ELVATON OUTFALL SEWER

PROPOSED GLEN BURNIE OUTFALL SEWER

AVAILABLE TREATMENT AREA

INSHORE OUTLET

ULTIMATE OUTLET

CRAIGHILL CHANNEL REAR LIGHT

CRAIGHILL CHANNEL FRONT LIGHT

SEVEN FOOT KNOLL LIGHT

SEWERAGE COMMISSION	MENDES COHEN F. H. HAMBLETON E. L. BARTLETT

Kenneth Allen
Prin. Asst. Engr.
April 10, 1899

It was suggested that the Commission should go abroad and examine for itself the working of these several modes of sewage treatment. This it was not possible to arrange immediately, owing to the home engagements of the several members, and it was concluded, with the approval of the Mayor, to engage instead the services of an English engineer to investigate and report upon the subject.

For this work the services of Mr. James Mansergh, of London, Vice-President of the Institution of Civil Engineers, Member of the Institution of Mechanical Engineers, etc., etc., a civil engineer of great experience and much distinction, were obtained. His report is presented herewith. (See Appendix F). Its conclusions are considered further on.

Of the two methods discussed in detail in the former report of the Commission, the first proposed to collect and convey the sewage to the eastward on its way to the bay; the other was designed, by a system flowing in an opposite direction, to collect and convey it to the southward, and under the Patapsco River to the Anne Arundel shore on its way to the filtration fields. (See Plate II.)

Both these plans have been revised with some modification of the original dimensions, and in the case of Project C, with a change of location of a portion of the lines of outfall, involving thereby some change in the location of the fields on which the outfall would be received. The details of these revisions are fully given in Appendixes B and D, where the revision of Project C is termed Project D, and that of Project K becomes Project L.

It has also been deemed expedient to include in the capital cost of the works the various district sewers, leaving only the smaller street and alley laterals, as the "reticulation system," to be provided for by direct assessment on the property immediately benefited. In the report of September 20, 1897, the cost of these district mains was included in the reticulation system, but in all the estimates

of the present report their cost forms part of the amount to be raised by a general loan.

This revised plan, hereinafter referred to as Project D, can be made available in its first installation for a population in connection with the sewers of about 200,000 from the low-level districts at an estimated cost in capital outlay of.....	$3,188,118
It will take from three to five years from the starting of the work to effect its progress to this extent. During this time there will be also constructed the system of laterals, which we have termed the reticulation system, to the extent needed to connect with the sewers the 200,000 population estimated for. The cost of these laterals should be met by a direct assessment against the property at once benefited thereby, as for street improvements. It is estimated at $1,500,000. This first opening of a portion of the low-level system may be followed by a commencement of work on the high-level system, and the extension to completion of the low-level system with such degree of rapidity only as the financial condition of the city and the demands of an increasing population may make necessary or desirable. These extensions, when sufficiently developed in future years to serve a population of one million, are estimated to involve a further capital outlay of.....	6,672,123
And of a further sum for the laterals of the reticulation system, to be assessed as before, against the property directly benefited, gradually, and as the various districts are brought into connection with the system, at a cost of $3,080,000.00, making a total outlay when the works are completed, to be met by city loans, amounting to.....	$9,860,241
And of assessments directly against the property benefited....	4,580,000
A grand total cost.....	$14,440,241

It is quite impossible at this stage of the problem to determine the property frontage against which the cost of the reticulation will be assessed, for there is a large area of the city in which the streets are not as yet laid out or established. However, from the best data available, it is believed that an assessment of $1.25 per front foot will fully cover the cost of this portion of the work.

The total cost of Filtration Project C was given in the report of 1897 as.....	$17,476,803
And now, as revised for Project D.....	14,440,241
A reduction of.....	$3,036,562

A revision of Project K, hereinafter in its revised form termed Project L, is here submitted:

The cost of Project L, at first installation serving a population in connection with the sewers of about 200,000, and including cost of district sewers, is estimated at a capital sum, to be provided by loan, of	* $3,202,846
The construction of the laterals or reticulation system, by which connection will be effected with the 200,000 population to be first served, will go on simultaneously with the outfall system at an estimated cost to be assessed against the property directly benefited of $1,500,000.	
The extension of the works to take in the other districts of the city will proceed at such rate as may be deemed expedient, and, when developed to an extent to serve the forecast population of one million, is estimated to cost the additional capital sum of	2,370,485
And a further sum for the laterals of the reticulation system, to be assessed against the property directly benefited, of $3,080,000.00, making the total estimated outlay, when the works are completed, to be met by city loans	$5,573,331
And by assessments against property benefited	4,580,000
A grand total cost for the revised Dilution Project L of	$10,153,331
The total cost of Dilution Project K was given in the report of 1897 as	$10,495,167
And now as revised for Project L	* 10,153,331
A reduction of	$341,836

As the cost of the reticulation is assumed to be the same with either project, and as it is proposed to meet it by direct assessment on the properties benefited, further discussion of the question of the cost of the different projects will have reference only to the amounts to be raised for their construction by loan on the credit of the city.

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*It is possible that the estimate made herein for submerged outfall mains may be reduced by about $144,000 for the first installation and $638,000 for the completed work, if anticipated results in improved methods of constructing and laying such mains, now proposed elsewhere, should be realized.

COMPARISON OF COST.

	For first installation, say within 5 years from first undertaking of the work	For completed work, say in 25 or 30 years when the population has reached a million.
The revised Filtration Project D requires.....	$3,188,118 00	$9,860,241 00
The revised Dilution Project L requires at the same stages of progress.....	3,202,846 00	5,573,331 00
	$14,728 00	$4,286,910 00

A difference of $14,728 in favor of Project D at first installation, and a difference of $4,286,910 in favor of Project L at completion of work.

The annual cost of maintenance and operation of these projects is estimated to be—

	On First Installation.	On Completed Work.
For Project D.....	$244,171 00	$781,683 00
For Project L.....	198,179 00	361,461 00
Difference in annual cost in favor of Project L.	$45,992 00	$420,222 00

SPECIAL SYSTEMS OF SEWAGE PURIFICATION.

Having presented in their revised form estimates for the disposal of the sewage under Projects D and L, your Commission will now discuss briefly the availibility of some special methods of sewage purification which have been brought to its attention.

The investigation of such systems as are now commanding attention abroad was entrusted, as already stated, to Mr. James Mansergh, C.E., of London, from whom we have a comprehensive report on the subject, accompanied by illustrative drawings and with a detailed discussion by Dr. G. Sims Woodhead, F.R.S.E., of the bacteriolytic action induced in the filters employed for effecting this purification. This places your Commission in position to decide upon the advisability of introducing at this time any of these methods for the purpose of avoiding the great cost of disposing of the sewage of Baltimore upon farming lands in Anne Arundel County.

It seems only necessary here for your Commission to announce the conclusions at which it arrives after full consideration of the information derived therefrom, as well as from the result of its own investigations in regard to the several systems.

The various methods of treatment which have received consideration are:

1st. The Waring system of bacterial oxidation.

2d. The Pennsylvania Sanitation Company's method of filtration.

3d. The Scott Moncrieff system of anaerobic treatment, followed by filtration through a series of thin beds superposed as trays one above another, the sewage being aerated as it drops through the intervals between the trays.

4th. The Dibdin system of bacterial filtration.

5th. The Cameron system of septic tank treatment, followed by filtration in aerobic beds similar to Dibdin's.

6th. The Lowcock system of filtration and forced aeration, involving the same principles as used by Waring.

7th. The Ferozone-Polarite process.

8th. Ducat's self-acting bacterial filters.

Whilst some of these processes have proved themselves effective and promising, and whilst all are claimed by their proprietors to fully meet the requirements demanded of your Commission, it must be recognized that the scale on which they have been tested is in every instance far below that which would be required for the treatment of the sewage of Baltimore, even at first installation.

Mr. Mansergh remarks (See Part III. of his report—Appendix F):

"Judging the Baltimore sewage problem from the bacterial standpoint at this distance there are two prominent features which immediately attract attention. The first is the enormous volume of sewage per head per day which your Commission is compelled to provide for, owing to what I cannot help thinking to be an extravagant user of water, prevailing I know all over the States.

"This is four times what we have to deal with here, and it means, of course, that the works for similar cases would be four times larger with you than with us. * * * *

"This means that the cost of installing large structural works for these new and not fully developed processes is greatly increased in your case, and if failure should result the consequences would be serious.

"There is also the consideration that diluted sewage like that of Baltimore may develop characteristics during bacterial treatment which have not appeared here. Presumably the task of cleansing the weak sewage ought to be easier than strong sewage, but this is by no means determined.

"The second feature at Baltimore is one wholly in favor of the bacterial processes, and it is the fact that you have the sea or large flowing rivers into which the filtrate would be discharged. Such waters are fully oxygenated and are therefore specially adapted for the reception of bacterial filtrates.

"With a sea outlet or an outfall into a big river near to the sea, I think the experience here would justify you in installing the Dibdin or the septic tank process for a small population of 10,000 or 20,000 persons, if an auxiliary means of dealing with the excess rain is provided.

"It is a long step from the 120,000 (imperial) gallons dealt with by the Dibdin system at Sutton, or from the 31,000 (imp.) gallons dealt with by the septic tank at Exeter, to the 40,000,000 (imp.) gallons at Baltimore, increasing in the future to a possible 120,000,000 (imp.) gallons, and one could wish there were a few intermediate examples.

"The big problem is, of course, merely the multiplication of the smaller ones, and there ought to be no insuperable difficulty in applying what has been achieved to the larger case, but it would be prudent to proceed tentatively."

The views entertained by your Commission, being in accord with those of Mr. Mansergh, it finds no warrant in

present experience for recommending the adoption, on the scale which the full requirements of Baltimore would involve, of any one of the treatment processes thus far considered.

At the same time it fully recognizes that one or more of them may prove available for the treatment of the sewage of some of outlying districts, and may, if future experience sustains the claims and anticipations of their advocates, yet become adequate to our service on a larger scale.

It may be said further that the success so far attained with some of these bacterial processes seems to have established their superiority to any form of chemical precipitation, a method which, in our former report, your Commission concluded had no advantages for application to the sewage of Baltimore.

The fact that by bacteriolytic action the suspended matter in the sewage is dissolved and eliminated, instead of being precipitated by aid of expensive chemicals into a *sludge* of no economic value and removable only at additional cost, is an element which alone is likely to control the determination of the method of treatment wherever disposal by filtration is deemed essential.

We now revert to a further consideration of Project D—the agricultural filtration scheme.

AGRICULTURAL FILTRATION ON ANNE ARUNDEL LANDS.

We have estimated that the first installation of this project will cost $3,188,118, and will occupy in construction a period of perhaps five years from its commencement. It will include practically the whole of the low-level service, and if efficiently carried out should intercept nearly all sewage now reaching the inner harbor, and should rid the city of the intolerable basin nuisance, besides effecting the sub-soil drainage of the business portion of the

city, and making possible dry basements and sub-cellars, where these cannot now be had.

This sewage, from some 200,000 persons, will be pumped to lands at Glen Burnie through one main of 56 inches in diameter.

Although this first installation of the low-level system has been limited in extent to a connection of 200,000 persons, the sewers and district mains will serve with extended interceptors and additional reticulation for a population which has been forecast as 600,000 eventually.

The high-level system might be under construction at the same time, but it is assumed that for financial reasons the city authorities may prefer to limit the rate progress to the low-level only, as estimated.

If such be the actual method of construction adopted, it will be possible at this stage of the work to modify the plans, if found expedient so to do.

AGRICULTURAL FILTRATION COMBINED WITH SPECIAL TREATMENT.

Should the interval occupied in the construction of this first stage of the work have served to demonstrate the capacity of the bacteriolytic method of sewage treatment to cope with the remaining or high-level portion of the Baltimore sewage, advantage may be taken of the fact to establish a treatment plant in the neighborhood of the village of Masonville, on the south shore of the Patapsco, with a considerable saving over the capital outlay necessary for the extension of the whole system to the agricultural filtration fields.

If this modification should prove to be justifiable the Western High-Level Interceptor will be constructed substantially as in Project D. The sewage from this source will enter the closed main at about Eutaw and Franklin streets, or say at an elevation of 90 feet above tide, and will be turned into the outfall main, used at the outstart

by the low-level system, and will flow through that main to Glen Burnie by gravity. (See Appendix C and Plate II.)

The low-level sewage, theretofore pumped to Glen Burnie against a head of 112 feet, will then be pumped only to Masonville against a head of 40 feet.

At Masonville such works and filter beds as the method adopted may require will be constructed and gradually extended as the increasing number of house connections may make necessary.

The construction of the Eastern High-Level Interceptor may be deferred until the treatment works are in operation.

If the result of their working be satisfactory this interceptor, instead of being so located as to deliver its sewage by gravity on the Anne Arundel fields, as by Project D, will be lowered 60 feet to a contour adequate only for delivery of the sewage to Masonville (See Plates III. and V.)

This arrangement will intercept and cut off from the low-level system perhaps as much as one-sixth of its sewage, leaving at a minimum the volume to be pumped to Masonville. It will, perhaps, require some modification in the pumping plant, but no increase of steam power.

It will avoid the necessity for the acquisition and use of some 3,000 additional acres of farming land, and also for the laying down of four 56-inch mains, aggregating in length 26½ miles, between Masonville and the more distant fields, and will save the cost of the increased pumping plant required to force the sewage to such distance.

It is estimated that with this modification the works may be completed for a sum of $3,411,870, in addition to the cost of first installation, making the entire capital cost of works under what we will term Project D-E, $6,599,988. For details of this estimate see Appendix C.

If, on effecting the first installation of Project D, there be not found sufficient warrant to justify the adoption of

the bacteriolytic treatment plant at Masonville, it will only remain to construct the high-level system and extend that of the low-level on the general lines of Project D, as described in Appendix B, at an aggregate additional cost as already stated, of $6,672,123.

RECOMMENDATIONS.

The Sewerage Commission, under its instructions as set forth on the first page of this report, but without a change in its belief that the plan first recommended is in every way the *best method* of disposal of the sewage of Baltimore, finds the *best alternative plan* to be as follows:

The construction of the *low-level system* of Project D, as described in detail in Appendix B, to the extent at first, however, only of a service connection to reach a population of about 200,000, and with delivery of the sewage on farming lands in the neighborhood of Glen Burnie, in Anne Arundel County, as an estimated capital cost of $3,188,118.

These sewers will have capacity for a population of about 600,000, although starting with but about one-third of that number in connection, and will be made to subserve a great part of the city lying south of North avenue and east of Eutaw street, together with a considerable section west of Eutaw street and south of Franklin street, and also a great part of the Federal Hill and Locust Point districts.

Further construction need not be undertaken until the low-level system is in successful operation.

It can then be determined, with the light which will by that time have been developed through experience in the bacteriolytic methods of sewage treatment, at home and abroad, whether the extension shall be on the general plan of Project D, involving an additional outlay of $6,672,123, or by the modification outlined as Project D-E, at a further cost of only $3,411,870.

As the first installation here recommended at a cost of

3¼ millions of dollars will be, by either plan, complete in itself, as far as it goes, and will cure the basin nuisance, the City can, on completion of this stage, rest long enough to review its action before issuing a further loan for its extension.

In the meantime population will have increased, upwards of six millions of the existing burthen of debt will have matured, and it may be expected will have been paid off, thus leaving the city in better shape to place new loans on the market.

For these reasons it appears best to your Commission to discuss the financial aspect of the question with reference only to this first stage of the proposed work.

Before proceeding to this discussion, however, the Commission desires to state that, should the method of disposal definitely adopted by the Mayor and City Council be that to which the Commission has given preference, to wit, crude discharge into the Chesapeake Bay, and should it ever be found that such discharge has become objectionable, it will not be more difficult or more costly to prepare filter beds on the bay shore, for the purification of the sewage, than to establish such a plant at Masonville.

This has been estimated for as Project L-M. (Appendix E.)

COMPARATIVE CAPITAL COST OF THE SEVERAL PROJECTS.

Project.	L.	L-M.	D.	D-E.
Character of Disposal.	Crude discharge into the Bay.	Discharge into the Bay after special treatment.	Agricultural filtration for the whole of the sewage.	Agricultural filtration for the low-level sewage only, and special treatment of the remainder at Masonville.
Cost at first installation.	$3,202,846	$3,202,846	$3,188,118	$3,188,118
Cost at completion for the needs of one million population.....	5,573,331	5,860,331	9,860,241	6,479,547

ANNUAL COST OF MAINTENANCE AND OPERATION OF THE SEVERAL PROJECTS.

Project.	L.	L-M.	D.	D-E.
At first installation.....	$198,179	No data for estimate available.	$244,171	No data for estimate available.
At final completion.....	361,461		781,683	

WAYS AND MEANS.

The estimates of the Commission show that the cost of the first installation, to serve the lower portions of the city and intercept the filth now reaching the basin, will be about three and a quarter millions of dollars, and is, at that stage, substantially the same for every project considered.

If this amount be raised by a 3½ per cent. loan, to run for fifty years, it is thought that a premium of at least 10 per cent. can be realized on its sale, yielding, say $325,000. It is assumed that this premium, when covered into the sinking fund, may be so invested as to yield 3 per cent. per annum.

The reinvestment of the accruing interest at this rate will, with the invested premium, amount in fifty years, at the maturity of the loan, to say $1,425,000.

The remaining amount, $1,825,000, required to pay off the loan at maturity, must be met by an annual payment to the sinking fund of a sum which, invested with its accruing interest at say 3 per cent., shall yield the required amount when the loan falls due.

The sum of $16,800 so invested annually will suffice for this, so that the annual payments on account of this loan will be—

For interest on loan of $3,250,000 at 3½%.....	$113,750
And for payment to sinking fund.....	16,800
A total of.....	$130,550

This amount is included in the estimates of annual cost of maintenance as here shown for the respective projects at first installation.

	L. Crude Discharge into the Bay.	D. Agricultural Filtration at Glen Burnie.
Total annual cost.....	$198,179.00	$244,170.00
Deduct allowance for depreciation and renewals.....	33,407.00	52,015.00
Leaves annual cost for interest, sinking fund and operation..	$164,772.00	$192,155.00
Requiring a tax rate per $100 of assessed valuation, respectively of.....	5½ cents.	6½ cents.

Whilst for proper comparison of the relative yearly cost of the different projects it is necessary to include an allowance for depreciation and renewals, as shown above, it does not seem either reasonable or proper to tax the people at the outstart to the extent necessary to raise and maintain a fund for such purpose. There should be no renewals for many years, and it will be time enough to establish such a fund when the works are approaching completion and there can be adopted a regular system of sewer rates, duly proportioned to the amount of sewage emanating from the various classes of houses, tenements and manufacturing establishments.

Hence, in our estimate of actual yearly cost, we omit this allowance for depreciation and provide only for interest on the loan, provision for the sinking fund and operation of the works.

In advance of the establishment of sewer rates the actual yearly cost must be met by general taxation, and for this purpose we find, on the assessment basis for next year, which may be taken at 300 millions of dollars, that a levy of 5½ cents for Project L and 6½ cents for Project D on every hundred dollars of assessed valuation will yield an amount sufficient to cover the annual cost of the first installation.

That the sewer rates which will eventually supersede the general tax need not be burthensome is readily seen.

In our report of September, 1897, it was shown that on an average of the previous three years 92,568 loads of filth were removed each year from cess-pools within the city

at a cost to the citizens of $2.50 per load. We were unable to ascertain the number of pits from which this volume was removed, and took the total number of houses in the city, then estimated at 92,779, as each contributing about one load to the total, at a cost of $2.50 per house.

As the necessity for maintaining cess-pools will cease as soon as connection is made with the sewerage system, there will then be at once an end to the constantly recurring expense of emptying these foul receptacles; a cost which now bears very unequally upon the property-holders, and most severely upon the owners of small tenements with pits of limited capacity. These rarely escape an annual emptying at a cost of from $2.50 to $7.50; whilst no necessity for such cleansing attaches to property favored by connection with existing drains, which is thus saved both nuisance and expense.

If the 200,000 population, which will be brought into connection with the system as first installed, occupy a proportionate number of houses to those accommodating the whole population of the city, we shall have about 35,684 house connections, from which an average rental of say $4.60 will meet the annual charges of Project L, and a rental of say $5.40 those of Project D.

If from these rates we deduct but $2.50 as the cost of present annual cleansing, we find that the enjoyment of a thorough and cleanly system of sewerage may be had at an annual cost to each house, which need not be more than from $2.10 to $2.90 in excess of what is now paid each year under present filthy and unhealthy conditions.

PROPOSED SEWERAGE COMPANY.

It has been suggested that the City of Baltimore cannot afford to incur the further burthen of debt which construction of a sewerage system will involve, and that consequently private capital should be enlisted through the medium of a stock company, which can be organized for the purpose of taking over the work of constructing and operating such a system.

Although this is not a question which this Commission might have been expected to discuss, it yet seems proper to give it consideration, and to present some views of the practical objections thereto.

Such a franchise, if granted, must of course include the right to locate the sewers as the engineers of the company may find expedient. There will be no end of conflict as to interferences between the proposed sewers and the existing storm-water drains, water mains and electric conduits. These differences may not be easily nor cheaply reconciled, particularly when it is found to be to the interest of the private corporation to spare its own treasury at the expense of that of the City.

As there would no doubt be included in the franchise of the private corporation provision for the city in the future to take over the entire plant, it would be the City's interest to have the work done in the most thorough manner. The interest of the company would, however, be to have the cost of construction kept as low as possible, consistently with a certain degree of stability and endurance, which would be measured by the proposed or conjectured length of its tenure of the franchise.

This difference of interest between the City and the contracting company will be apt to result in imperfect work, leaking sewers, involving unsanitary conditions, more or less obscure, but not the less dangerous because unobserved and unknown.

The contracting company will look for its profits to come from the densely built portions of the city, and will naturally resist the demand for extensions until it be deemed that a paying population can be reached. This has been the experience at Galveston, where we learn the city is now trying to get rid of the contracting company.

Of course, private capital will look for and require a larger profit than the three per cent. rate, or less, at which the city is now able to borrow. This profit must be high enough to cover the cost of blunders, accidents, damages

and all possible contingencies, though these unfavorable conditions may never occur.

It would surely seem that, as the householders will in any event be charged a rate high enough to cover these contingencies, their advantage would be found in doing the work themselves, and paying no higher annual rate than sufficient to cover the cost of administration of the works.

It has been suggested that a private corporation will readily undertake to pay a handsome annual bonus to the City for the franchise. This is no doubt the case, but what does it mean? Simply that the contracting company must have the right to charge the householder a rate sufficiently high not only to cover all the proper expenses and contingencies to which we have referred, together with the dividends to the company's stockholders, but high enough to cover also the amount of bonus to be paid the City.

This scheme becomes, therefore, as a measure of economy to the citizens, a mere delusion and a snare. If they have, in addition to the annual cost of operating the works, to pay the profits or dividends of the contracting corporation and its bonus to the City, they might as well themselves pay the cost of operating the works, tax themselves for the bonus, save altogether the sum that is to go out in dividends to the stockholders and have into the bargain the entire control of their works.

The experience of New Orleans in the attempt which that city has made to save itself the capital outlay for a sewerage system should not be overlooked.

As far back as 1880 a franchise was granted to the New Orleans Sewerage Company to sewer the city. The company was organized with a prominent and trusted citizen at its head. Able engineers were consulted and plans prepared.

The result up to the present time is simply nothing accomplished. A few hundred feet of sewer only have been con-

structed. No part of the work is in operation. The contracting company, apparently conducted for the benefit of individuals, stockholders and contractors, and not for that of the city, is reported to have failed, and the city is now legislating to take the whole scheme into its own hands and raise the amount of money necessary to enable it to undertake and press forward the construction of the works by its own officers.

CONCENTRATION OF ALL SEWER AND DRAIN CONSTRUCTION.

Your Commission, during its investigations, has been repeatedly asked if it be advisable to continue the construction of storm-water drains, or sewers as they are popularly termed, which are from time to time ordered to be built by ordinance of the Mayor and City Council.

It has always replied that, whilst it is advisable and often necessary to expend money to repair and maintain existing drains, no others should be constructed until the general system of sewerage is adopted. Thereafter all drains and sewers should be designed by the same department, and should be constructed with reference to general requirements and under the responsibilty of determining when the necessity for the undertaking really exists. It will then be time enough to ask for authority to construct.

In the absence of a comprehensive general design, far too much money has been already expended in these constructions, some of which will have to be altered or rebuilt in the future.

SELECTION OF PLAN.

There should be no further delay in deciding what is the system of sewerage construction to be adopted by the City.

This Commission has reduced the proposition, as it believes, to its simplest terms, and the Mayor and City Council must determine which of the two methods of disposal shall be adopted,

I. Crude discharge into Chesapeake Bay (Project L), with possible future modification (Project L-M).

II. Filtration on land in Anne Arundel County (Project D), with possible future modification (Project D-E).

The question must be decided by weighing the greater capital outlay and greater annual cost of the more complicated Project D, against the possibility, real or sentimental, of injury to the oyster interests in carrying to completion the more simple arrangements of Project L.

That there is pressing need for prompt decision in this matter must be recognized when we state that the main intercepting and district sewers, many of which will be of large size, should be located, and if possible constructed, in advance of other works.

The sewage flows through these conduits by gravity, and in order to maintain velocity adequate to carry all matter held in suspension and avoid offensive deposits, adjustments somewhat intricate have been involved in the designs so as to effect the crossings of the railway tunnels, the passage of Jones' Falls and the interference of large storm-water drains. It has even been necessary to modify the form of some of the latter in order to adjust the interferences.

With the peculiar topographical features of Baltimore, it may be well nigh impossible to further change the location of the great sewers to avoid interference with water mains, gas pipes, electrical subways and surface railroads, and hence the sooner the city locates its sewers and defines its requirements in its own streets the better. What may have to be done in the case of certain streets through which these main sewers must pass, and which are already partly, if not wholly occupied, is not for this Commission to consider. Its duty is fully performed in urging upon the attention of the Mayor and City Council the expediency of avoiding further delay.

The difficulties here referred to apply only to the great intercepting and district sewers. No trouble is anticipated in so locating the small lateral sewers of the reticulation system, partly through the alleys and under the sidewalks, as to avoid interference with other works.

If the action here recommended be taken and a decision be made by the Mayor and City Council as to the plan and method of disposal to be adopted, this should be immediately followed by fixing the location of the great and more important sewers. Steps should also be taken to have carefully prepared, in advance of the meeting of the General Assembly in January, 1900, such form of enabling act as may be desirable, and under which, if enacted, the City may take measures to acquire the land needed for the works and the funds necessary for their execution.

If, as is now to be feared, there may be much further delay before there be opportunity to submit for *referendum* any enabling act so passed, engineers may be advantageously employed, under temporary appropriations by the Mayor and City Council, in revising and perfecting the location of the work and in preparing for its letting under the system which the authorities, in their wisdom, may deem most advantageous to the interests of the city.

It cannot be too strongly impressed upon the city authorities that in work of this magnitude every dollar spent under a competent engineer in preparation and revision is returned many fold in the economies thereby effected.

CONCLUSION.

The obligation of the Commission to those who, during its earlier investigations, aided it in various ways was expressed in terms of appreciation in the last report.

It now desires to make its acknowledgments for valuable information and advice, more recently received, to Professors Ira Remsen and Wm. H. Welch, of Johns Hopkins University; to Prof. G. Sims Woodhead, of the University

of Cambridge, and to Dr. Samuel Rideal, of London, England.

For courteous attentions in various forms, often involving their time and correspondence, the Commission would express its thanks to:—

Messrs. J. W. Alvord, C. E.	Edwd. H. Jenkins, Ph.D.
M. N. Baker, Ph. B.	W. Kiersted, C. E.
Geo. M. Bowers.	Prof. C. A. Lindsley, M.D.
Wm. M. Brown, Jr., C.E.	D. E. McComb, C. E.
Robert A. Cairns, C. E.	L. E. McGann.
Harry W. Clark.	F. H. Newell.
Albert S. Crane, C. E.	Jno. B. Parsons.
Chas. G. Currier, M. D.	C. O. Probst, M. D.
George G. Earl, C. E.	B. T. Smelzer, M. D.
Harrison P. Eddy, C. E.	Prof. A. N. Talbot, C. E.
Prof. A. P. Folwell, C. E.	Capt. E. S. S. Turner.
X. H. Goodnough, C. E.	H. F. Turner.
T. C. Hatton, C. E.	W. S. Twining, C. E.
Samuel S. Hoff, C. E.	M. A. Veeder, M. D.
Wm. T. Hunt.	F. J. Walz.
Richard W. Iglehart, C.E.	A. G. Young, M. D.

Also, for valuable information and documents to the following foreign correspondents:

Messrs. Jos. Garfield, C. E.,	Wolverhampton, England.
Thos. Hewson, C. E.,	Leeds, "
George Reid, M. D.,	Stafford, "

Your Commission desires, at the close of its labor, to place on record its appreciation of the efficient service rendered by Mr. Kenneth Allen, its Principal Assistant Engineer, who has had charge of all the details of its investigations, revision and estimates.

Mr. Charles E. Taylor, as Assistant Engineer, has conducted the field work made necessary by the revision of the line, and has skillfully executed the required map work.

As heretofore, Mr. C. L. Rector has had charge of the accounts and correspondence of the Commission and has performed his several duties with intelligence and satisfaction.

In conclusion, the Commission expresses the hope that the result of its labors may be found acceptable, and that from the recommendations of this report a suitable plan may be adopted, under which the sewerage of the City may be undertaken without further delay.

The entire work submitted to the Commission being concluded, and its duty completed by the submission of this report, it respectfully asks that its report be accepted and that the Commission be discharged.

All of which is respectfully submitted.

MENDES COHEN,
F. H. HAMBLETON,
E. L. BARTLETT,
} *Sewerage Commission of the City of Baltimore.*

BALTIMORE, 22nd May, 1899.

APPENDIX.

APPENDIX A.

ELEMENTS INVOLVED IN REVISION OF COST.

In the revision of estimated cost a reduction has been made by reducing the dimensions of all sewers from those described and estimated for by the Consulting Engineers, as given in the report of the Commission dated September 20, 1897.

The warrant for this change is to be found in the following statement of facts:

When the data on which to base their estimates were furnished to the Consulting Engineers, the Water Department claimed to be supplying daily an amount of water reaching at a maximum 72,000,000 gallons, with a daily average consumption of 120 gallons per head of population.*

Whilst this amount was recognized as excessively large the Consulting Engineers did not feel warranted in basing their calculation on any less quantity.

Taking this, therefore, as the actual consumption, they added an amount to cover infiltration of ground-water, some accession of storm-water, and an uncertain quantity required for flushing, and arrived at a total of 150 gallons per head of population as the amount of sewage for which it would be necessary to provide, and on this quantity their estimates of cost were based.

After the report of the Consulting Engineers was made up, a change of administration of the Water Department led to a revision of data, when it was ascertained that the maximum daily consumption of water did not quite reach 52,000,000 gallons, or about 95 gallons per head of population.

The annual report of the Water Department for the year 1897 gives the average daily consumption throughout the year as 88 gallons per head of population served. Your Commission has based its revised estimate on this average daily consumption, 88 gallons per head, and has

*Report to the President and Members of the Baltimore Water Board by Samuel M. Gray, Consulting Engineer, October, 1896, pp. 3 and 9.

added thereto an amount even larger in proportion than allowed by the Consulting Engineers to cover flushing, influx of ground-water and contingencies, thus arriving at 117 gallons as the average amount of sewage to be provided for daily per head of population.

As, however, the pumping plant and discharge mains must be adequate to provide for the maximum flow which may at any time reach them, separate estimates have been made of the probable maximum flow in different portions of the city.

For the low-level districts 140 gallons per head of population is deemed amply sufficient to cover all inflow of ground-water, flushing, etc., whilst for the high-level districts 106 gallons per head is found to be an equally full allowance.

On these estimates of volume the dimensions of the various intercepting sewers have been re-calculated and the revised estimates are based thereon.

SEWERAGE COMMISSION OF THE CITY OF BALTIMORE

MAP SHOWING INTERCEPTORS, DISTRICT MAINS AND SEWERAGE DISTRICTS

AGRICULTURAL FILTRATION PROJECT

1899

SEWERAGE COMMISSION | MENDES COHEN, F H HAMBLETON, E L BARTLETT

Kenneth Allen
Prin. Asst. Engr.
April 15, 1899

NOTE.

INDICATES LOCATION OF INTERCEPTORS
" EASTERN HIGH-LEVEL INTERCEPTOR TREATMENT AT MASONVILLE.
" DISTRICT MAINS
" AREA SEWERED BY GRAVITY
" " " " PUMPING

Scale 0 ¼ ½ ¾ 1 Mile

DRUID HILL PARK
DRUID LAKE
LAKE MONTEBELLO
CLIFTON PARK
LAKE CLIFTON
GREEN MOUNT CEMETERY
BALTIMORE CEMETERY
PATTERSON PARK
RAY VIEW ASYLUM
BACK RIVER
PUMPING STATION
HARBOR
NORTH WEST BRANCH
MIDDLE BRANCH
PATAPSCO RIVER
OUTFALL MAINS 5-56" STEEL PIPES
MASONVILLE

APPENDIX B.

PROJECT D.

The location and profiles of the intercepting sewers of Project D are shown by Plates III. and IV. and are as described below. These are approximate only, and may, with their diameters, require slight modification when the time for construction arrives.

First Installation for Low-Level Service.

Whilst the population to be provided for at first installation is but 200,000, the dimensions of the sewers are adequate for the population of 600,000, which may ultimately be connected therewith.

The Western Low-Level Interceptor.

This runs from the intersection of Putnam and Russell streets along the latter to Bush street, with a diameter of 3 feet 3 inches. It continues thence with a diameter of 4 feet 6 inches to Stockholm street, when it is enlarged to a diameter of 5 feet 6 inches, and runs on Stockholm street to the pumping station. For first installation, the construction on Russell street west of Ostend street, may be deferred and is not included in the estimate.

The Eastern Low-Level Interceptor.

This is designed to take about four million gallons per day from territory now beyond the eastern city limits, and runs on Boston street from the city limits to the Harris Creek Drain with a diameter of 2 feet 9 inches. Passing under this drain by a siphon of two 18-inch cast-iron pipes, it continues with a diameter of 4 feet 3 inches on Boston and Aliceanna streets to Washington street, where it is increased in size to 5 feet 9 inches, and runs on Aliceanna street, Caroline street, Eastern avenue and Albemarle street to Pratt street. From this point it has a diameter of 6 feet 3 inches, and continues in Albemarle street to Lom-

bard street, to Front street and to a point opposite Water street. Thence the size is increased to 7 feet 6 inches as far as the west side of Centre Market Space, Jones' Falls being crossed by an inverted siphon composed of two 36-inch steel pipes, laid in a brick-lined tunnel. From Centre Market Space the line continues on Water, Calvert, Lombard, Light and Balderston streets to Charles street with a diameter of 7 feet 9 inches, and thence on Charles street to York street with a diameter of 8 feet. Here the sewage from the York Street Interceptor is received and the diameter is increased to 8 feet 3 inches, and the line continues on Charles, Montgomery and Leadenhall streets to the pumping station at Stockholm street. For first installation the portion of this interceptor east of the Harris Creek Drain has not been included in the estimate.

The Locust Point Interceptor.

This starts from Garrett avenue and runs on Clement street to Hull street with a diameter of 18 inches; thence on Clement street to Allen street with a diameter of 21 inches; thence on Allen street to Claggett street with a diameter of 2 feet 3 inches; thence to and along Winder street to Marshall street with a diameter of 2 feet 9 inches; thence on Winder, Race, Barney and Leadenhall streets to Fort avenue with a diameter of 3 feet 3 inches, and from Fort avenue to the pumping station at Stockholm street with a diameter of 4 feet 3 inches. The construction of the portion of this interceptor beyond the intersection of Barney and Race streets may be deferred until after first installation, and is not included in the estimate.

The York Street Interceptor.

This begins at a point in Clement street about 200 feet east of the centre of Jackson street, runs northerly and then westerly through private property to Jackson street, to West street, to Belt street, through the latter and private property to Rupert street, to Montgomery street, to Covington street, to Hughes avenue and to Battery avenue, with a diameter of 15 inches. From Hughes avenue it continues with a diameter of 20 inches through Battery avenue and York street to Charles street, where it unites with the Eastern Low-Level Interceptor. The construction of the portion of this interceptor beyond the intersection of Hughes and Battery avenues may be deferred until after first installation, and is not included in the estimate.

The velocities attained in the low-level interceptors, when running half full, are as follows:

Western Low-Level Interceptor, four feet per second; Eastern Low-Level Interceptor, four feet per second east of Washington street and west of Front street. Between those two points the gradient is reduced so as to provide a velocity of three and one-half feet per second, in order to be sufficiently low at Washington street to avoid an inverted siphon. The Locust Point and York Street Interceptors are designed for a velocity of but three feet per second in order, by lowering the grade, to effect, as far as possible, the sewerage of the entire peninsula, a few marginal areas only being excluded.

Pumping Plant.

The sewage collected by means of these several interceptors will be delivered at a pumping station, to be located at or near the intersection of Leadenhall and Stockholm streets, as contemplated in Project C, with a level of invert 14.12 feet below mean low tide.

Here must be provided a pumping plant, which at first need be adequate only to the work contemplated at first installation.

This will require the daily disposal of 28 million gallons of sewage, which must be lifted by the pumps from the level of 10 feet below mean low tide to a height of 52 feet above the same datum, involving a total maximum resistance equivalent to about 112 feet of head.

As one-half of the sewage must be provided for in eight hours, the pumping plant must have a capacity sufficient to lift 42 million gallons per day against this head.

To meet this service the estimates provide four 500 horse-power boilers and three 25 million gallon pumps, with two 3 million gallon pumps to dispose of the ground water, which will be separately collected and discharged directly into the river.

Outfall Main.

To carry the amount of sewage collected at first installation to the filtration fields, but one outfall main of 56 inches diameter is requisite Nevertheless, it is deemed a proper measure of economy in effecting the costly crossing of the Patapsco River to lay down at once under the river three of the five outfall mains which will be ultimately required, and on this basis the estimates have been developed.

The revised line for the outfall mains follows the course suggested by the Consulting Engineers for Project C to near the city end of the Long Bridge at the foot of Byrd street.

Thence the line deviates from the former course, and, passing under the river by a shorter length of submerged main than by Project C,

reaches the Anne Arundel shore at a point about 2,200 feet, as measured along the shore, to the eastward of the bridge terminus. From the shore the line continues past the village of Masonville with a gradual rise along the eastern slope of the ridge, which in Project C was traversed by tunnel, and passing southerly through the village of South Baltimore reaches a point near the banks of Cabin Creek, whence, if required by future extension of the filtration project, a main will lead off in a southeasterly direction to Marley Neck.

From this point of divergence the outfall main will continue on its ascending grade, passing under Cabin Creek, and will make a junction with the original line of Project C, at a point on that line about three miles south of the Long Bridge, whence it continues very nearly on the original line to the Glen Burnie filtration fields.

Here ample provision should be made for possible needs, and the estimate of land required, some 1,800 acres, is substantially the same as that recommended for this locality by the Consulting Engineers in their estimates for Project C.

Completed Work.

Low-Level Service.

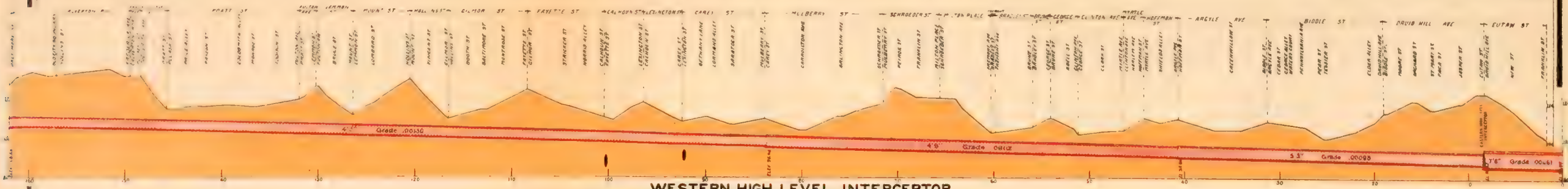
This will provide for a population of 600,000, and the required interceptors are already described under the head of first installation, p. 43.

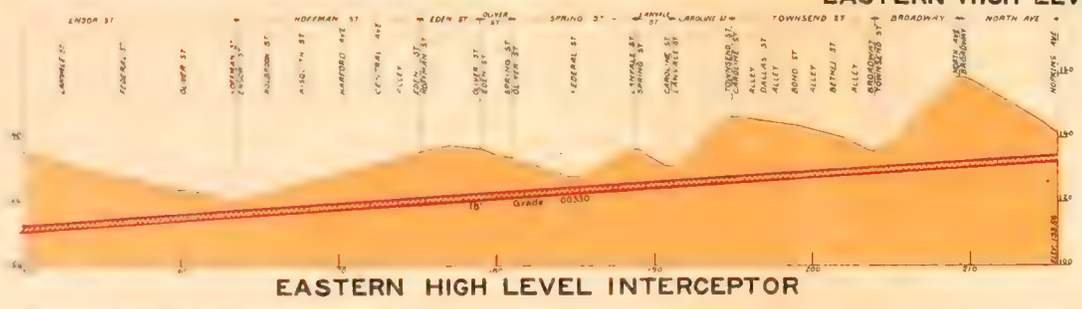
High-Level Service.

The High-Level Interceptors discharge into gravity mains at a slightly lower elevation than in Project C, and hence may terminate at a point on Eutaw street, opposite Eutaw Court, or 180 feet south of the centre of Franklin street.

The Western High-Level Interceptor.

Beginning at Baltimore street and Calverton road, to which point is brought the sewage from all the territory to the north lying east of Gwynn's Falls, the Western High-Level Interceptor follows the latter road with a diameter of 4 feet 3 inches to Frederick avenue, to Pulaski street, to Pratt street, to Fulton avenue, to Lemmon street, to Mount street, to Hollins street, to Gilmor street, to Fayette street, to Calhoun street, to Lexington street, to Carey street and to Mulberry street. At this point the diameter is increased to 4 feet 9 inches and the line continues along Mulberry street, Schroeder street, Milton Place, Fremont

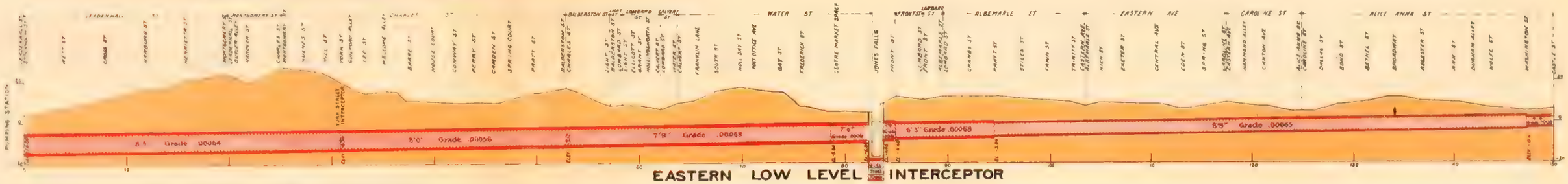


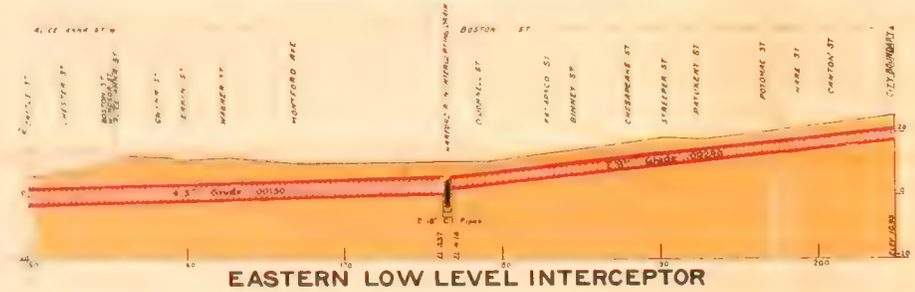


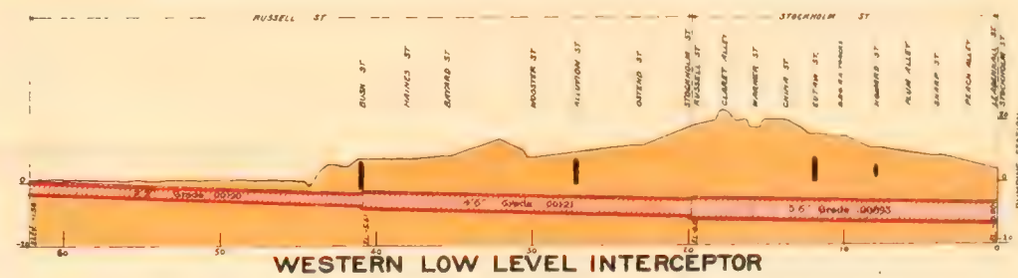
SEWERAGE COMMISSION OF THE CITY OF BALTIMORE

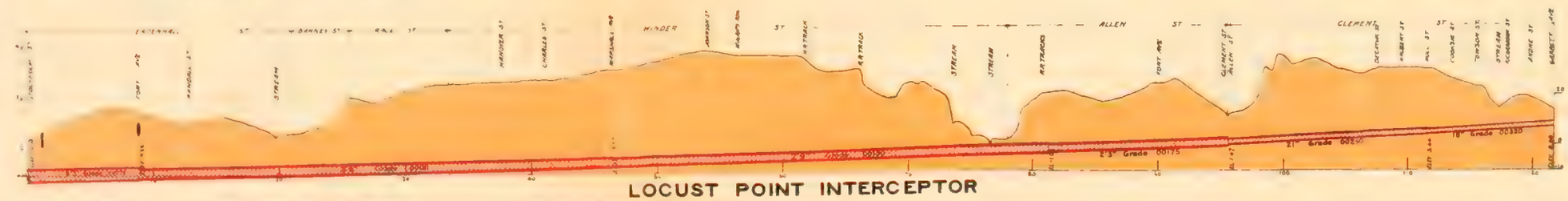
PROFILE OF INTERCEPTING SEWERS FOR THE AGRICULTURAL FILTRATION PROJECT

1899





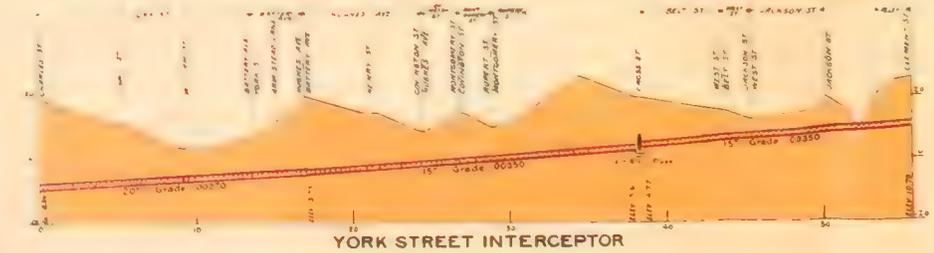




HORIZONTAL SCALE

VERTICAL SCALE

DATUM MEAN LOW TIDE AT BALTIMORE
ELEVATIONS OF SEWERS REFER TO CENTER LINE



Note The interceptors are designed for the following velocities when running half full
Locust Point Interceptor York Street Interceptor and that portion of the Eastern High Level Interceptor lying east of Jones Falls 3 feet per second.
Eastern Low Level Interceptor from Pratt street to Washington street and Eastern High Level Interceptor west of Jones Falls 3½ feet per second.
Eastern Low Level Interceptor west of Front street and east of Washington street Western Low Level Interceptor and Western High Level Interceptor 4 feet per second.

SEWERAGE COMMISSION { MENDES COHEN, F H HAMBLETON, E L BARTLETT

Kenneth Allen
Chief Asst. Engr.
April 8, 1899

Tracing by Chas. H. Taylor

avenue, Bradley street, Brune street, George street, Clinton avenue, Myrtle avenue and Hoffman street to Argyle avenue. Here the diameter is again increased to 5 feet 3 inches and the line passes by Argyle avenue, Biddle street and Druid Hill avenue to Eutaw street, where, at Ross street, it is joined by the Eastern High-Level Interceptor and a diameter of 7 feet 6 inches is required to its terminus opposite Eutaw Court.

The Eastern High-Level Interceptor.

On account of the reduced capacity required, the revised interceptors have smaller diameters and steeper gradients than those in Project C, and for this reason the eastern end of the Eastern High-Level Interceptor has been located on higher ground than in that project.

Beginning on North avenue, at Hopkins avenue, with a diameter of 18 inches, it runs westerly to Broadway, and thence through Broadway, Townsend street, Caroline street, Lanvale street, Spring street, Oliver street, Eden street, Hoffman street and Ensor street to Twentieth street. Here it receives considerable sewage from the valley of Jenkins' Run, and continues on Twentieth street and under Jenkins' Run in a siphon of two 16-inch cast-iron pipes, and then in the same street in a 3-foot 3-inch sewer to Barclay street, to North avenue, to the line of Hargrove alley, through the grounds of the Blind Asylum and Hargrove alley to Twenty-first street. Here a diameter of 4 feet is required, and this is maintained along the latter street to Jefferson Place. At this point the interceptor receives the sewage from the territory lying between Jones' Falls and Waverly, and is carried by a siphon consisting of two 24-inch cast-iron pipes, laid in a brick-lined tunnel under the valley of Jones' Falls, to a point near North avenue and McMechen street. From this point it follows McMechen street with a diameter of 5 feet to the west side of Mt. Royal avenue, where it is again enlarged to a diameter of 5 feet 9 inches, and runs on Mt. Royal avenue, Lanvale street, Rutter alley, Dolphin street and Park avenue to Camel alley. Thence it continues with a diameter of 6 feet on Park avenue, Monument, Howard and Ross streets to Eutaw street, where it joins the Western High-Level Interceptor, as described.

The velocity in the Western High-Level Interceptor, when running half full, will be 4 feet per second throughout. In the Eastern High-Level Interceptor a velocity of 3½ feet per second is obtained for that portion lying west of Jones' Falls, while for the balance the velocity has been reduced to 3 feet per second to avoid an increased length of siphon under Jenkins' Run, and in order to include as much territory as practicable in the high-level system. A reduction of velocity on the West-

ern High Level Interceptor did not appear advisable, because the greater slope of the ground in its vicinity would have rendered any considerable increase of available drainage by a change of sewer gradients impossible.

The high level sewage collected from a population of 400,000 is estimated to average 39,200,000 gallons per day when the works are complete, and it will be delivered by two 56-inch steel gravity mains to the Glen Burnie filtration fields.

Pumping Plant.

On the completion of the work the low level interceptors will deliver on an average 78 million gallons, and a maximum of 84 million gallons of sewage per day to the pumps. The latter must, however, be of capacity to take sewage at times of greatest flow, or at a rate of 126 million gallons per day, and pump it as shown below:

Destination.	Maximum Rate of Flow.	Lift in Feet.
Marley	42,000,000 gals. per day.	110
Elvaton	42,000,000 " "	131
Elvaton	42,000,000 " "	144

For this service five 25 million gallon pumps are required, which, with one in additon to provide for contingencies and two 3 million gallon pumps for ground water, give a total capacity of 156 million gallons per day.

To provide the power for this work six 500 horse-power boilers will be required which, with two held in reserve for repairs and contingencies, will supply a total of 4,000 horse-power.

Lines of Outfall Mains.

There will be ultimately required five outfall mains 56 inches in diameter, of which three will serve a population of 600,000 in the low-level districts and two a population of 400,000 in the high-level districts.

The Low-Level Outfall Mains.

All the low-level mains follow the line described on p. 45 for the first installation from the pumping station to a point near Cabin Creek, where the first will diverge in a southeasterly direction, and passing first under Cabin Creek and then under Curtis Creek by inverted siphons, will continue to a point on Marley Neck, near the Marley Road, which is of sufficient elevation—57 feet above datum—to permit the irrigation of some 1,080 acres. It is designed to carry 40 million gallons per day.

The second and third low-level mains follow the line described for first installation to the Glen Burnie fields and continue beyond, crossing

Marley Creek and terminating, respectively, 2,600 and 3,600 feet beyond the cross roads at Marley. The first will deliver 22 million gallons per day at elevation 55; and the second 22 million gallons per day at elevation 66.

Of these 44 million gallons, 8 million will be utilized on the Glen Burnie fields and 36 million will irrigate some 720 acres at Elvaton.

The High-Level Outfall Mains.

The two high-level mains will take the sewage collected by the high-level interceptors at Eutaw street, near Franklin, to the Glen Burnie fields on lines as described for the low-level main for first installation, delivering at elevations 52 feet and 46 feet, respectively, above mean low-tide. They will together carry 42 million gallons per day, which, with the 8 million gallons delivered from the low-level main, will irrigate 1,380 acres of land.

PROJECT D—AGRICULTURAL FILTRATION.

ESTIMATES OF COST.

A.—Summaries for Construction.

a. For First Installation.

Land to be acquired for filtration at Glen Burnie	$186,000 00	
Preparing thereof 720 acres	747,324 00	
Building and utensils for four stations	26,667 00	
Force mains	793,276 00	
Right of way	15,000 00	
Pumping station at Stockholm and Leadenhall streets	235,800 00	
Pumping machinery, three 25,000,000 gallon pumps and two 3,000,000 gallon pumps	278,000 00	
Boilers, four 500 horse-power	32,000 00	
Eastern Low-Level Interceptor, west of Harris Creek	552,760 00	
Western Low-Level Interceptor, east of Ostend street	61,677 00	
Locust Point Interceptor, west of Race street	49,423 00	
York Street Interceptor, north of Hughes avenue	10,191 00	
	$2,988,118 00	
Add for district main sewers	200,000 00	
		$3,188,118 00

b. For Completed Work, to serve a population of one million.

Land to be acquired for filtration	$344,000 00	
Preparing 2,765 acres	2,869,932 00	
Buildings and utensils for fourteen stations	93,333 00	
Force and gravity mains	3,588,594 00	
Right of way	25,000 00	
Pumping station at Stockholm and Leadenhall streets	262,000 00	
Pumping machinery, six 25,000,000 gallon pumps and two 3,000,000 gallon pumps	548,000 00	
Boilers, eight 500 horse-power	64,000 00	
Eastern Low-Level Interceptor	588,665 00	
Western Low-Level Interceptor	133,014 00	
Eastern High-Level Interceptor	265,390 00	
Western High-Level Interceptor	174,516 00	
Locust Point Interceptor	178,566 00	
York Street Interceptor	25,231 00	
	$9,160,241 00	
Add for district main sewers	700,000 00	
Total		$9,860,241 00

B.—Summaries for Annual Maintenance, Interest and Renewals.

a. For First Installation :

Interest on first cost, including payment to sinking fund, $3,188,118.00 @ 4%			$127,524 72
Depreciation and renewals:			
On interceptors, reticulation and district mains, $2,374,051 @ ½%		$11,870 26	
On buildings, pumping station, etc., $262,467 @ 1%		2,624 67	
On discharge mains, $793,276 @ 3%		23,798 28	
On pumping machinery, $278,000 @ 4%		11,120 00	
On boilers, $32,000 @ 5%		1,600 00	
On siphons, $33,409 @ 3%		1,002 27	
			$52,015 48
Operation:			
Cost of pumping:			
Per day:			
Wages	$18 75		
Oil and waste	2 50		
Coal, 12 net tons @ $2.50	30 00		
	$51 25		
Add 10% for contingencies	5 13		
365 days @	$56 38	$20,578 70	
Carried forward		$20,578 70	$179,540 20

Brought forward		$20,578 70	$179,540 20
Cleaning and inspection of interceptors and district mains		1,700 00	
Cleaning and inspection of reticulation system.		15,000 00	
Operation of filtration fields and cleaning discharge mains		25,852 00	
Superintendent		1,500 00	
			$64,630 70
Total			$244,170 90
b. For Completed Work:			
Interest on first cost, including payment to sinking fund, $9,860,241 @ 4%			$394,409 64
Depreciation and renewals:			
On interceptors, district mains and reticulation, $6,645,382 @ ½%		$33,226 91	
On pumping station, buildings, etc., $355,333 @ 1%		3,553 33	
On discharge mains, $3,588,594 @ 3%		107,657 82	
On pumping machinery, $548,000 @ 4%		21,920 00	
On boilers, $64,000 @ 5%		3,200 00	
On siphons, $122,174 @ 3%		3,665 22	
			$173,223 28
Operation:			
Cost of pumping:			
Per day:			
Wages	$40 50		
Oil and waste	5 00		
Coal, 42 net tons @ $2 50	105 00		
	$150 50		
Add 10% for contingencies	15 05		
365 days @	$165 55	$60,425 75	
Cleaning and inspection of interceptors and district mains		3,000 00	
Cleaning and inspection of reticulation system.		45,800 00	
Operation of filtration fields and cleaning discharge mains		100,324 00	
Superintendents, 3 @ $1,500 00		4,500 00	
			$214,049 75
Total			$781,682 67

APPENDIX C.

PROJECT D-E.

A project termed E has been worked out contemplating the delivery of the sewage at treatment works in the vicinity of Masonville, Anne Arundel county. Under this plan the high-level sewage, amounting on an average to about 66 million gallons per day from a forecast population of 633,000 persons, would be collected at Eutaw and Camden streets, from which point it would flow by gravity through three 56-inch steel mains to the treatment works.

The low-level sewage, amounting to an average of about 51 million gallons per day from a population forecast at 367,000 persons, would be collected, as in Project D, at a pumping station near the intersection of Stockholm and Leadenhall streets, from which point it would be pumped through two 56-inch steel discharge mains to the above treatment works.

This project, as a whole, is not recommended for reasons given on page 22, but, should treatment of sewage at Masonville be found desirable in the future, there would be an economy resulting from a combination of Projects D and E, as referred to on page 24, and described below as Project D-E.

First Installation.

The first installation of Project D-E is identical with that of Project D, described in Appendix B.

Completed Work.

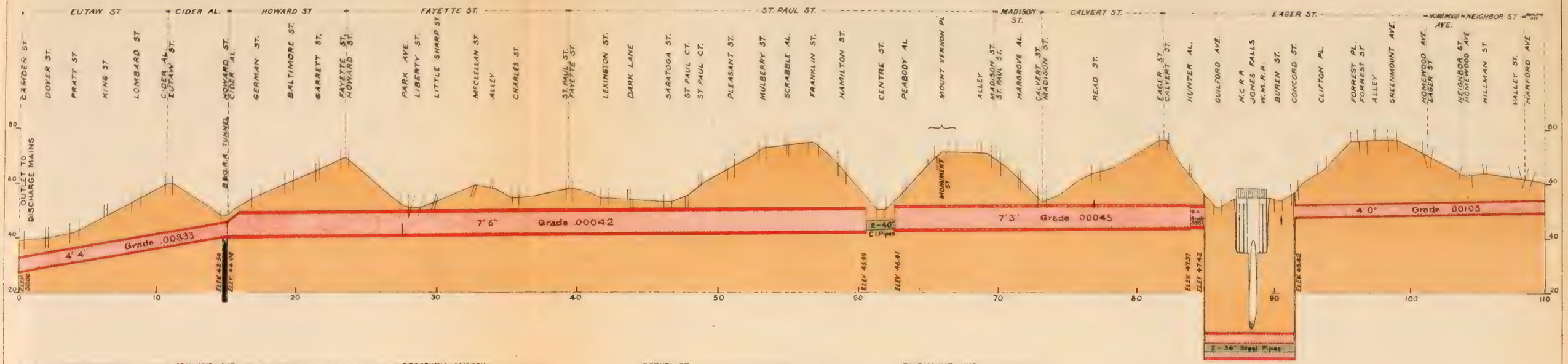
Interceptors.

For the completed work the low-level interceptors and the Western High-Level Interceptor are identical with those described in Appendix B for Project D. The Eastern High-Level Interceptor would, however, be lowered to deliver as much sewage as possible by gravity at Masonville.

The Eastern High-Level Interceptor (Plate V) begins at Fairmount avenue and Chapel street with a diameter of 12 inches. It follows Fairmount avenue to Bethel street, where it is given a diameter of 2 feet 9 inches to Madison street, to the west side of Broadway and to Ashland avenue. Here, in order to avoid a long detour up the valley of Harford Run, the latter is crossed on Ashland avenue by a siphon, consisting of two 24-inch cast-iron pipes, and at Caroline street passes over the drain which runs on Ashland avenue, between Bond street and Caroline street. The siphon extends to Central avenue, whence the line continues as a 4-foot sewer; thence on Ashland avenue to Neighbor street, to Homewood avenue, to Eager street and to Concord street. Here a shaft leads to an inverted siphon, consisting of two 36-inch steel pipes, laid in a tunnel under Jones' Falls, to a second shaft located 100 feet east of Hunter alley. At this point the sewage rises to the interceptor, 6 feet 6 inches in diameter, as far as Hunter alley; thence 7 feet 3 inches in diameter, still in Eager street, to Calvert; in Calvert to Madison, requiring at Read street a modification of the drain in that street; in Madison street to St. Paul street, and in St. Paul street to 100 feet north of Centre street. Here, to retain sufficient cover, the section must be modified, or the single interceptor may be changed to two lines of 40-inch cast-iron pipe with their inverts connecting the inverts of the brick sewers above and below. One hundred feet south of Centre street, a single conduit, 7 feet 6 inches in diameter, is resumed, which continues to Fayette street, and on Fayette street to Howard street. At Park avenue the present drain will require re-location. The interceptor then extends on the east side of Howard street to Cider alley. Here, to obtain cover, the top is depressed, and the interceptor crosses over the Belt Line tunnel. It continues thence in Cider alley and Eutaw street to the inlet of the gravity discharge mains at Camden street, with so steep a gradient that the diameter is reduced to 4 feet 4 inches. The velocity, when running half full, is 3½ feet per second as far as the tunnel crossing, below which it is 11 feet per second. This velocity must be considered in the design and materials of this section of the interceptor.

Pumping Plant.

The low-level sewage reaching the pumping station will, by this arrangement, eventually reach a maximum of 66 million gallons per day, and the pumps will require a capacity to lift this at the rate of 98 million gallons per day, at periods of maximum discharge, through a vertical height of 40 feet. For this the boilers and engine power supplied for first installation will be ample, but the pumping capacity will have to be increased to about 125 million gallons per day.



SEWERAGE COMMISSION OF THE CITY OF BALTIMORE

PROFILE OF THE EASTERN HIGH LEVEL INTERCEPTOR

PROJECT—TREATMENT AT MASONVILLE

1899

DATUM MEAN LOW TIDE AT BALTIMORE
ELEVATIONS OF INTERCEPTOR REFER TO CENTER LINE.

THE INTERCEPTOR IS DESIGNED FOR A MINIMUM VELOCITY WHEN RUNNING HALF FULL, OF 3½ FEET PER SECOND

HORIZONTAL 0 1 2 3 4 500 6 7 8 9 1000 Feet
VERTICAL 0 10 20 30 40 80 Feet

SCALES

Sewerage Commission { Mendes Cohen, F. H. Hambleton, E. L. Bartlett

Kenneth Allen
Prin. Asst. Engr.
March 23, 1899

Drawn by Chas. E. Taylor

Outfall Mains.

There will be required five 56-inch steel outfall mains. The main originally laid from the pumping station to Glen Burnie will be disconnected from the pumps and extended up Eutaw street to near Franklin street, where it will receive the sewage from the Western High-Level Interceptor, amounting to some 19 million gallons per day, and convey it by gravity to the Glen Burnie fields at a maximum rate of about 28 million gallons per day.

Two gravity mains will extend from the terminus of the Eastern High-Level Interceptor, at Eutaw and Camden streets, to Masonville. The sewage collected by the Eastern High-Level Interceptor amounts to a maximum of about 34 million gallons per day, requiring a capacity of pipes equal to 51 million gallons per day.

Two more mains will take low-level sewage exclusively, and extend from the pumping station to Masonville. The low-level sewage has been stated as amounting at times to 66 million gallons per day, requiring provision at times of maximum flow for 98 million gallons per day.

Now, with the assumed hydraulic gradient of 0.11 per cent., these two mains will carry but about 81 million gallons per day, leaving a deficit in capacity of pipes of some 17 million gallons per day. We have, however, in the two pipes leading from the Eastern High-Level Interceptor, an hydraulic gradient of 0.081 per cent., furnishing together a capacity of 71 million gallons per day; but as the required capacity is but 51 million gallons per day, there will be an excess in capacity which may be utilized by pumping, when found necessary, the remaining 17 million gallons of low-level sewage into one of these mains.

Treatment of Sewage.

The maximum volume of sewage to be disposed of is 126 million gallons per day. Of this, 19 million from the Western High-Level Interceptor will flow by gravity to the Glen Burnie fields, leaving 107 million gallons to be delivered at Masonville for treatment.

It has been recommended to defer decision in regard to the possible use of a treatment plant at this point until after the first installation is effected, under the plans of Project D. By this time, it is thought, accumulated experience in the use of the new methods of bacterial purification will suffice to demonstrate what particular method, if any, is most likely to meet efficiently the requirements of Baltimore.

The acreage necessary for the daily treatment of 107 million gallons of sewage by any of the methods may be had in the neighborhood of Masonville, and an approximate estimate of the cost of establishing a plant has been made on the basis of recorded experience abroad.

PROJECT D-E—AGRICULTURAL FILTRATION COMBINED WITH SPECIAL TREATMENT.

ESTIMATES OF COST.

Summaries for Construction.

a. First Installation, for a population of 200,000.		
Estimate as for Project D		$3,188,118 00
b. Completed Work, for a population of 1,000,000.		
Land for disposal	$186,000 00	
Preparation of filtration fields	747,324 00	
Land for treatment	70,000 00	
Preparation of filter beds	1,075,000 00	
Buildings and utensils	36,667 00	
Force and gravity mains, gates, branches, etc.	1,798,291 00	
Right of way	15,000 00	
Pumping station at Stockholm and Leadenhall streets	235,800 00	
Pumping machinery	350,000 00	
Boilers	32,000 00	
Low-Level Interceptors (D)	925,476 00	
Western High-Level Interceptor (D)	174,516 00	
Eastern High-Level Interceptor (E)	253,914 00	
	$5,899,988 00	
Add for District Main Sewers	700,000 00	
Total		$6,599,988 00

SEWERAGE PROJECTS
FOR THE
CITY OF BALTIMORE

DILUTION IN CHESAPEAKE BAY

MAP SHOWING
SEWERAGE DISTRICTS, INTERCEPTING SEWERS
AND
MAIN DISTRICT SEWERS
Jointly Presented
BY

Rudolph Hering AND Samuel M. Gray
CONSULTING ENGINEERS

REPRODUCED TO ILLUSTRATE PROJECT L, WITH WHICH IT IS NEARLY IDENTICAL

1899

SEWERAGE COMMISSION | MENDES COHEN, F H HAMBLETON, E.L. BARTLETT

Kenneth Allen
Prin. Asst. Engr.
April 15, 1899

NOTE.
- INDICATES LOCATION OF INTERCEPTORS
- " DISTRICT MAINS
- " AREA SEWERED BY GRAVITY
- " " " " PUMPING

Scale
0 ¼ ½ ¾ 1 Mile

APPENDIX D.

PROJECT L.

Project L is, in its essential features, identical with Projects A and K of the Commission's report of September 20, 1897, but modified in accordance with the diminished volume of sewage.

Plates II., VI., VII. and VIII. of the present report will serve to illustrate it sufficiently as now presented.

First Installation.

Eastern Low-Level Interceptor.

The Eastern Low-Level Interceptor runs along Glover alley from Canton street, to Foster avenue, to Luzerne street, to Hudson street, to Boston street, to Aliceanna street, to Caroline street, to Eastern avenue, to Albemarle street, to Lombard street, and along Front street to the pumping station.

Western Low-Level Interceptor.

The Western Low-Level Interceptor runs northeasterly from Putnam street on Russell, where it may, if required, collect the sewage from a considerable territory lying beyond the present city limits. Russell street for three or four blocks is as yet but a marsh, and will have to be raised several feet. The interceptor then passes under the Bush Street Drain in a siphon of two cast-iron pipes, and then under the Alluvion Street Drain to Stockholm street, to Leadenhall, to Montgomery, to Charles, to Balderston, to Light, to Lombard, to Calvert, to Water street and under Jones' Falls in two steel pipes to the pumping station. For first installation the construction on Russell street west of Ostend may be deferred, and is not included in the estimate.

Locust Point and York Street Interceptors.

Two interceptors from Locust Point will enter the Western Low-Level Interceptor—one at Stockholm and Leadenhall streets and one at York

street. The former will collect the sewage from the greater part of Locust Point, and is located on Clement, Allen, Winder, Race, Barney and Leadenhall streets to Stockholm street.

The York Street Interceptor drains a narrow district to the northeast of a line between Federal Hill and Riverside Park, and is located on Belt, Rupert, Montgomery and Covington streets, Hughes and Battery avenues, and York street to Charles street.

The construction of that portion of the Locust Point Interceptor lying beyond the intersection of Barney and Race streets, and that of the York Street Interceptor beyond Hughes and Battery avenues, may be deferred until after first installation, and are not included in the estimate.

Force-Main.

The sewage brought by the Low-Level Interceptors to the pumping station on the east side of Jones' Falls, a short distance north of Lombard street, is pumped thence in a 48-inch cast-iron force-main laid in the bed of Lombard street to Broadway, where it is delivered to the High-Level Interceptor.

High-Level Interceptor.

For first installation the High-Level Interceptor begins at Broadway and Lombard streets, and runs thence easterly to Ann street, to Pratt street, to Chapel street, to Gough street, to Duncan alley, to Bank street, to Patterson Park avenue, to Eastern avenue and easterly on the same, diverging into an embankment in the south side of Patterson Park, to Streeper street. Here it turns to the south and, in order to keep under cover, the grade of Eastern avenue will have to be slightly raised at this point. At Fait avenue it runs eastward to Patuxent street, then to Hudson, to Potomac, to Dillon and to the eastern city boundary.

Outfall Sewer and Submerged Outlet.

From this point the Outfall Sewer continues in a general southeasterly direction to the shores of Chesapeake Bay, crossing Bear Creek by a submerged siphon, a total distance of 11.23 miles. It is 11 feet 6 inches in diameter, and is designed to take the maximum discharge from the forecast population of one million when running two-thirds full; and its gradient will ensure a uniform velocity when half full of four feet per second. These conditions, with the elevation at outlet for a free discharge of the sewage, are elements which control the area of the city which may be served by the High-Level Interceptor without pumping.

At the upper end of the outfall sewer a settling chamber will arrest any sand, gravel, etc., brought from above, while at the lower end the sewage will pass through a gate-house to a 66-inch submerged outlet pipe extending, at first installation, 5,000 feet out into the bay.

The sewage thus disposed of will amount at first installation to a maximum daily flow of 20 million gallons per day from 144,000 persons in the low-level districts, and of 6 million gallons per day from 56,000 persons in the adjacent high-level districts.

Pumping Plant.

The sewage will be delivered by the low-level interceptors at the pumping station, near Lombard and Front streets, and will there be lifted against a hydraulic head of about 54 feet through the force main to the High-Level Interceptor at Broadway and Lombard street.

As one-half of the sewage must be provided for in 8 hours, the pumping plant must have a capacity sufficient to lift 30 million gallons per day against this head.

To meet this service the estimates provide three 160 horse-power boilers and three 15 million gallon pumps, with two 3 million gallon pumps to dispose of the ground-water, which will be separately collected and discharged directly into Jones' Falls.

Completed Work.

Low-Level Interceptors.

The Low-Level Interceptors, which have already been described under the head of First Installation, will provide for a population of 215,000.

High-Level Interceptor.

The Main or High-Level Interceptor collects the sewage from that portion of the city lying above or to the north of it, and, with the Outfall Sewer, conveys it to the submerged outlets in Chesapeake Bay by gravity.

The entire sewage of the valleys of Gwynn's Falls and Gwynn's Run lying to the north will be collected at the intersection of Wilkens avenue and Bentalou street, from which point the interceptor is projected southeasterly to the Baltimore and Ohio Railroad property, thence parallel to the same to Calhoun street, in Calhoun to Hollins street, to Carey, to Lombard, and under the Calhoun Street and Carey Street Drains, to effect which a modified section may be required. It continues in Lombard to Schroeder, Pratt, Scott and Lombard streets, and up Fre-

mont avenue to German street. Here it passes in a siphon of two cast-iron pipes under the Pine Street and Arch Street Drains near their junction at Penn street, over the Baltimore and Ohio Railroad tunnel, which is just cleared at German and Howard streets, up the latter to Fayette street, and eastward in that street. At Park avenue the Liberty Street Drain, 4 feet 6 inches in diameter, will have to be carried under the sewer. Continuing in Fayette street to St. Paul street, it turns northerly into the latter, whence it continues to Madison street, to Calvert street, to Eager street, to Guilford avenue, thence northerly about 200 feet, thence easterly, and, dropping by a shaft to a lower level, it extends as a siphon of two steel pipes laid in a tunnel under Jones' Falls. On the eastern side of the Falls it rises again and runs south to Eager street, thence to Forrest street, to Madison street and to Caroline street. At Eden street, where the Central Avenue Drain is crossed, a re-location of the latter may be necessary. The line continues southerly on Caroline street to Mullikin street, to Bond street, to Fairmount avenue, to Bethel street, to Baltimore street, to Broadway and to Lombard street. Here it receives the low-level sewage, and continues as already described for first installation. The high-level service will serve a population of 785,000.

Pumping Plant.

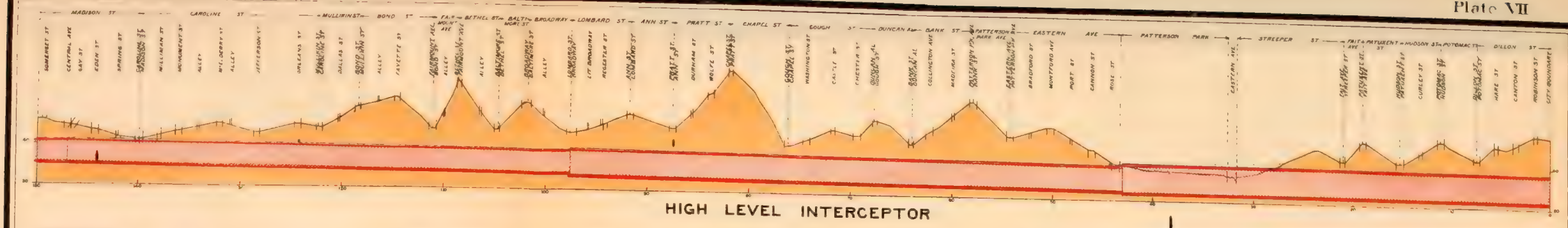
On the completion of the work the low-level interceptors will deliver on an average 28 million gallons and a maximum of 30 million gallons of sewage per day to the pumps. The latter must, however, be of capacity to take the sewage at times of greatest flow, or at a rate of 45 million gallons per day, and pump it with a lift of about 54 feet to the high-level interceptor.

For this service three 15 million gallon pumps are required, which, with one in addition to provide for contingencies and two 3 million gallon pumps for ground-water, give a total capacity of 66 million gallons per day.

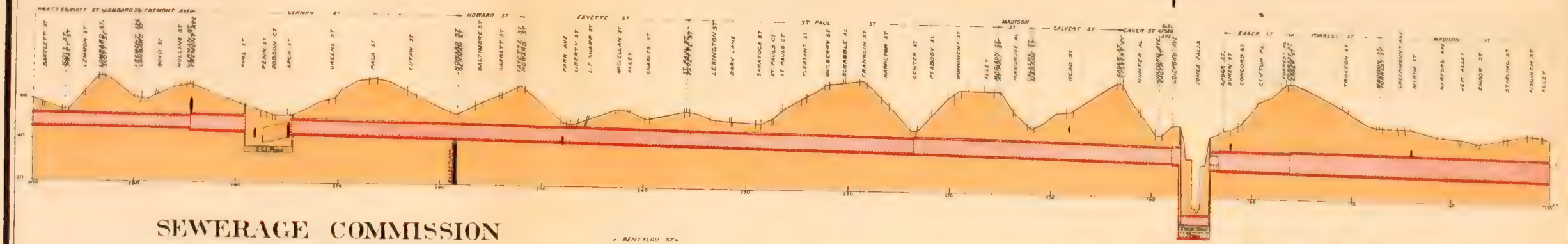
To provide the power for this work three 160 horse-power boilers will be required, which, with one held in reserve for repairs and contingencies, will supply a total of 640 horse-power.

Outfall Sewer and Submerged Outlets.

The Outfall Sewer to the Chesapeake Bay provided for first installation will serve for the completed work without additional cost, but a second submerged 66-inch main will become necessary, which is estimated for, to extend from the shore to the point marked K in Plate II, about $2\frac{4}{10}$

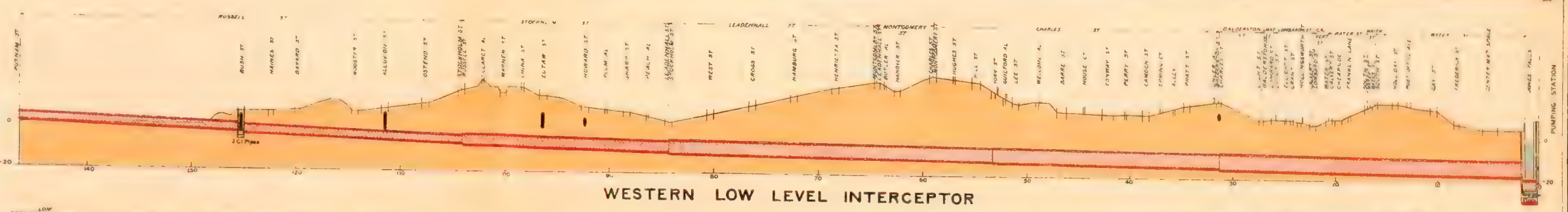


HIGH LEVEL INTERCEPTOR

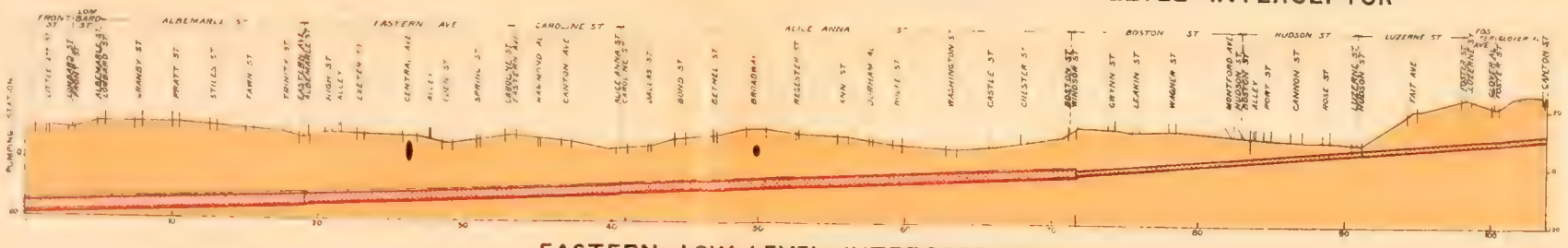


SEWERAGE COMMISSION
OF THE
CITY OF BALTIMORE

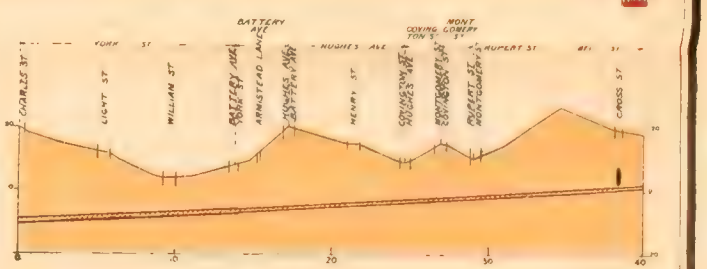
PROFILE OF INTERCEPTING SEWERS
FOR THE
CHESAPEAKE BAY DILUTION PROJECT.
1899



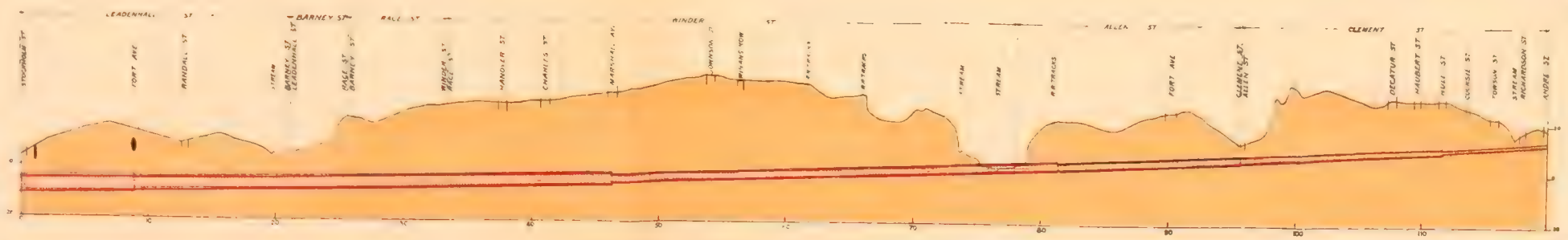
WESTERN LOW LEVEL INTERCEPTOR



EASTERN LOW LEVEL INTERCEPTOR



YORK STREET INTERCEPTOR



LOCUST POINT INTERCEPTOR

Note: The interceptors are designed for a velocity of 3 feet per second, running half full, excepting the following which have been modified to meet local conditions. High Level Interceptor Centre St to Fall Run, Eastern Low Level Interceptor east of Fleming St and the York St and Locust Point Interceptors.

HORIZONTAL SCALE

VERTICAL SCALE

DATUM MEAN LOW TIDE AT BALTIMORE
ELEVATIONS OF SEWERS REFER TO CENTER LINE

Sewerage Commission { Mendes Cohen, P.H. Hambleton, E.L. Bartlett

Kenneth Allen
Chief Asst. Engr.
April 1, 1899

Drawn by R.F. Kerrington

miles east of Rear Range Light. At the same time it may be deemed expedient to extend the first submerged main to about the same distance from shore. The cost of effecting this is also included in the estimates.

PROJECT L—DILUTION.

ESTIMATES OF COST.

A—Summaries for Construction.

a. For First Installation:

Pumping station near Front and Lombard streets.	$69,880 00	
Pumping machinery, three 15,000,000 gallon pumps and two 3,000,000 gallon pumps	120,500 00	
Boilers, three 160 horse-power.	7,680 00	
Force main, 3,630 feet of 48-inch cast-iron pipe..	39,950 00	
High-Level Interceptor, east of Broadway.....	344,332 00	
Low-Level Interceptor, east of Russell street....	349,535 00	
Locust Point Interceptor, west of Race street....	49,423 00	
York Street Interceptor, north of Hughes avenue.	10,191 00	
Outfall Sewer, City boundary to Chesapeake Bay.	1,698,855 00	
Right of way, City boundary to Chesapeake Bay.	25,000 00	
One 66-inch submerged outlet pipe in the Bay, 5,000 feet in length.....	287,500 00	
	$3,002,846 00	
Add for District Main Sewers.....	200,000 00	
Total.....		$3,202,846 00

b. For Completed Work, to serve a population of one million.

Pumping station near Front and Lombard streets.	$69,880 00	
Pumping machinery, four 15,000,000 gallon pumps and two 3,000,000 gallon pumps.....	158,000 00	
Boilers, four 160 horse-power.....	10,240 00	
Force main, 3,630 feet of 48-inch cast-iron pipe..	39,950 00	
Interceptors	1,594,906 00	
Outfall Sewer, City boundary to Chesapeake Bay.	1,698,855 00	
Right of way, City boundary to Chesapeake Bay.	25,000 00	
Two 66-inch submerged outlet pipes in the Bay, 11,100 feet in length.....	1,276,500 00	
	$4,873,331 00	
Add for District Main Sewers.....	700,000 00	
Total.....		$5,573,331 00

B.—Summaries for Annual Maintenance, Interest and Renewals.

a. For First Installation:

Interest on first cost, including payment to sinking fund, $3,202,846 @ 4%			$128,113 84
Depreciation and renewals:			
On interceptors, out-fall sewer, reticulation and district mains, $4,152,336 @ ½%		$20,761 68	
On submerged outlet and pumping station, $357,380 @ 1%		3,573 80	
On force main, $39,950 @ 3%		1,198 50	
On pumping machinery, $120,500 @ 4%		4,820 00	
On boilers, $7,680 @ 5%		384 00	
On siphons, $88,985 @ 3%		2,669 55	
			$33,407 53
Operation:			
Cost of pumping:			
Per day:			
Wages	$17 75		
Oil and waste	2 00		
Coal, 7.0 net tons @ $2.50	17 50		
	37 25		
10%	3 73		
365 days @	$40 98	$14,957 70	
Cleaning and inspection of interceptors and district mains		2,075 00	
Cleaning and inspection of reticulation system.		15,000 00	
Cleaning and inspection of outfall, 5 men @ $625 00		3,125 00	
Superintendent		1,500 00	
			$36,657 70
Total			$198,179 07

b. For Completed Work:

Interest on first cost, including payment to sinking fund, $5,573,331 00 @ 4%			$222,933 24
Depreciation and renewals:			
On reticulation, interceptors, outfall sewer and district mains, $8,573,761 @ ½%		$42,868 81	
On submerged outlet and pumping station, $1,346,380 @1%		13,463 80	
On force main, $39,950 @ 3%		1,198 50	
On pumping machinery, $158,000 00 @ 4%		6,320 00	
On boilers, $10,240 @ 5%		512 00	
On siphons, $99,053 @ 3%		2,971 59	
			67,334 70
Carried forward			$290,267 94

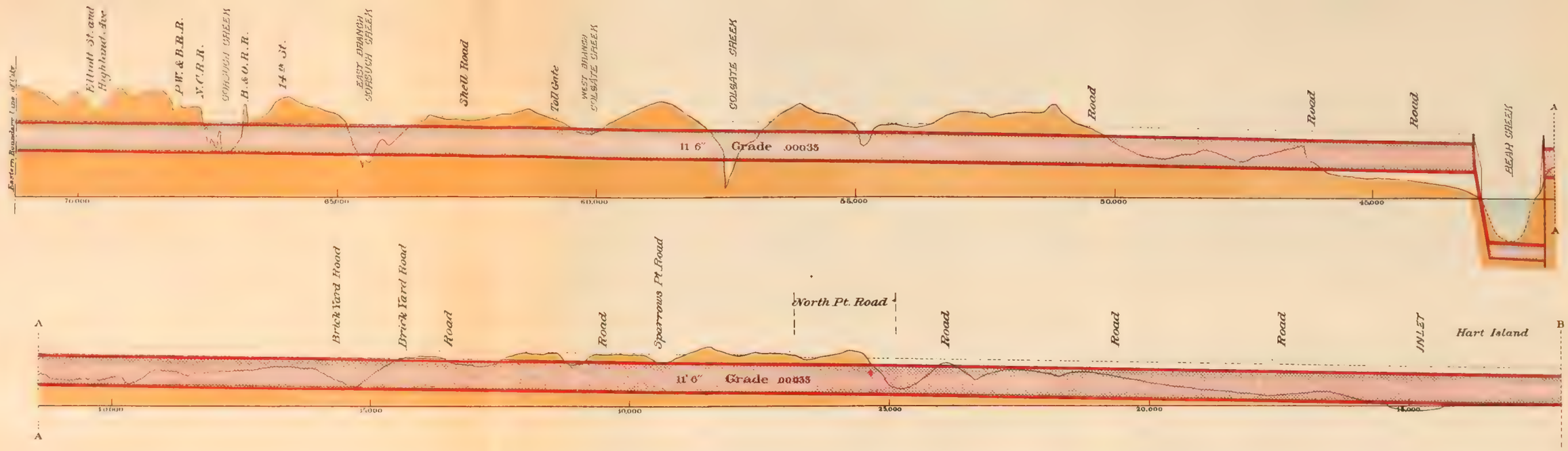
Brought forward			$290,267 94
Operation:			
Cost of pumping:			
Per day:			
Wages	$20 25		
Oil and Waste	2 75		
Coal, 8.5 net tons @ $2 50	21 25		
	$44 25		
10%	4 43		
365 days @	$48 68	$17,768 20	
Cleaning and inspection of interceptors, and district mains		3,000 00	
Cleaning and inspection of reticulation system		45,800 00	
Cleaning and inspection of outfall, 5 men @ $625 00		3,125 00	
Superintendent		1,500 00	
			71,193 20
Total			$361,461 14

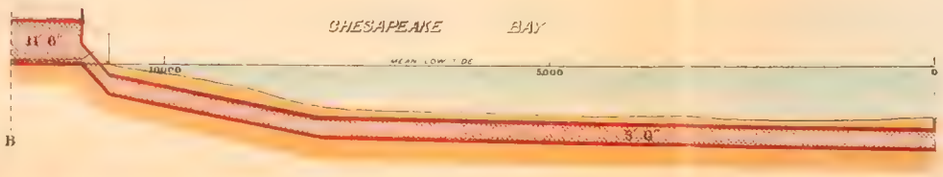
SEWERAGE COMMISSION
OF THE
CITY OF BALTIMORE

PROFILE AND SECTIONS
OF
OUTFALL SEWER AND BEAR CREEK SIPHON
DILUTION PROJECT
1899

SEWERAGE COMMISSION { MENDES COHEN, F H HAMBLETON, E L BARTLETT

Kenneth Allen
Prin. Asst. Engr.
April 20, 1899

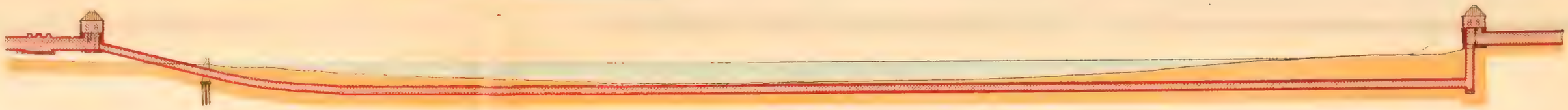




PROFILE ON LINE OF OUTFALL SEWER

Horizontal Scale

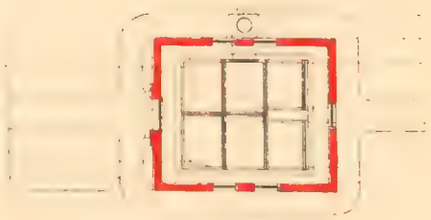
Vertical Scale



Profile

SIPHON UNDER BEAR CREEK

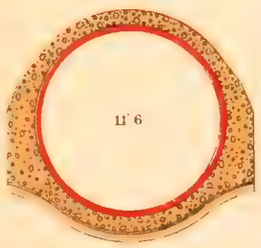
Scale



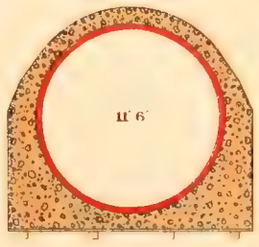
Enlarged Plan of Gate House at West End of Siphon

Scale

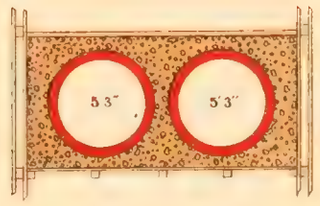
Section at Manhole



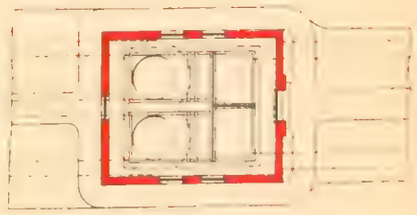
Sewer on Cradle



Sewer on Platform



Section of Siphon



Enlarged Plan of Gate House at East End of Siphon

Scale

SECTIONS OF OUTFALL SEWER

APPENDIX E.

PROJECT L-M.

As has been mentioned on page 27, if it should be found desirable to treat the sewage before delivery into the bay by Project L, the necessary works can be built advantageously in the vicinity of the shores of the bay. The cost of such a plan has been estimated and is hereby presented as Project L-M.

First Installation.

The first installation of Project L-M is identical with that of Project L, which is already described on page 57.

Completed Work.

The completed work of Project L-M is identical with that of Project L to a point near the shores of the bay.

Here, instead of continuing to and under the waters of the bay by submerged outlet mains, the sewage would be directed to a bacterial treatment plant for which adequate ground can be located without difficulty, and at much less cost than at Masonville.

PROJECT L-M.—DILUTION COMBINED WITH SPECIAL TREATMENT.

ESTIMATES OF COST.

Summaries of Construction.

a. First Installation, for a population of 200,000.

Estimated cost the same as for Project L..... $3,202,846 00

b. Completed Work, for one million persons.

Pumping station near Front and Lombard streets	$69,880 00	
Pumping machinery	158,000 00	
Boilers	10,240 00	
Force main	39,950 00	
Interceptors	1,594,906 00	
Outfall sewer	1,698,855 00	
Right of way	25,000 00	
One 66-inch submerged outlet pipe 5,000 feet in length	287,500 00	
Land for treatment	16,000 00	
Preparation of bacterial filters	1,250,000 00	
House, utensils, etc	10,000 00	
	$5,160,331 00	
Add for district main sewers	700,000 00	
Total		$5,860,331 00

APPENDIX F.

REPORT OF JAMES MANSERGH, ESQ., C.E.,

ON THE

BACTERIAL TREATMENT OF SEWAGE IN ENGLAND.

LONDON, 11th January, 1899.

To the Chairman and Members of the
Sewerage Commission of the City of Baltimore:

GENTLEMEN:

On the 11th August last your Chairman, Mendes Cohen, Esq., Past-President of the American Society of Civil Engineers, asked me by letter if I would undertake to advise you as to the bacterial treatment of sewage now much discussed in England, and after a short correspondence I agreed to do so.

My attention was requested particularly to the following processes:

(1) Dibdin's bacterial filters.
(2) Cameron's septic tank.
(3) Scott-Moncrieff's system.
(4) Lowcock's aerated bacterial filters.
(5) The Ferozone-polarite process.

And I have added a sixth to the list, viz:

(6) Ducat's self-acting bacterial filter.

My advice was requested as to the efficiency and availability of the methods of bacterial treatment now being tested and to the degree of their development. Also whether any of the methods are so successful as to warrant their application to the treatment of 40 million to 120 million Imperial gallons per day, and if not yet proved reliable for such an amount of duty, whether they are suitable for suburban districts with a sewage flow of one to two and a half million Imperial gallons per day.

In order to get the latest facts, my partner, Mr. Strachan, has specially examined Dibdin's filters at Sutton and Barking, Cameron's septic tank at Exeter and Yeovil, Lowcock's aerated bacterial filters at Wolver-

hampton, the Ferozone-polarite process at Huddersfield and Chorley, and Ducat's self-acting filter at Hendon.

I asked Dr. Sims Woodhead, F. R. S. E., Director of the Research Laboratories of the Conjoint Board of Physicians (London) and Surgeons (England), to co-operate with me as to the bacteriological features of the processes, and I append those extracts from his report which are of especial interest.

Accompanying this report there are 5 drawings to illustrate and explain the descriptions:

(1) The Dibdin bacterial filters at Sutton.

(2) The Cameron septic tank at Exeter.

(3) Ducat's aerated filters, the polarite filters at Chorley and Lowcock's filters.

(4) A diagram showing the effect of subdivision on the rotation of the filters.

(5) A diagram showing the rotation of the filters during rain.

It will conduce to a full understanding if I divide my report into three, and I propose in the first part to set out the facts and results of each of the processes, in the second to criticise them, and in the third to add a few words as to their applicability to Baltimore.

Part I.

Dibdin's Bacterial Filters.

In the summer of 1892 the London County Council conducted a series of small experiments on the filtration of the sewage effluent from the precipitation tanks at the northern sewage works of the Metropolis at Barking, by passing it through filters containing burnt ballast, pea ballast, coke breeze, sand and polarite.

At the Barking works the crude sewage is first treated with 3.7 grains of lime and one grain of protosulphate of iron per gallon, and after passing slowly through the precipitation tanks the sewage effluent is turned into the storage chambers and then discharged into the River Thames opposite the works. The effect of the precipitation is shown by the following table, which gives the average results of a complete series of two-hour samples for the whole year 1894:

	Crude sewage. Grains per gallon.	Sewage effluent. Grains per gallon.
Total suspended matter	29.8	7.1
Total dissolved solids	60.2	63.2
Chlorine	11.1	10.8
Oxygen absorbed from permanganate in 4 hours	3.124	3.225
Free Ammonia	3.027	3.137
Albuminoid Ammonia	0.353	0.356

Broadly speaking, there is a considerable reduction of the suspended matters, but in other respects the analyses show little difference between the crude sewage and the effluent, the process being specially designed for the removal of the suspended matters only.

The filters were each about 24 yards in area, and something less than 200,000 gallons of sewage effluent was filtered through them. The results obtained appeared to show the superiority of coke breeze as the filtering medium, and accordingly a filter having an area of one acre was made, in which fine pan breeze was placed for a depth of 3 feet and covered with a 3-inch layer of gravel as a weighting material. There were perforated drain-pipes laid on the bottom of the filter to assist in the discharge of the filtrate, which passed into a ditch and then into the river.

At the outset an attempt was made to pass one and a quarter million gallons per day through this filter, with the result that it ceased to act in about six weeks, and became putrid throughout.

It was allowed a period of rest, and at the end of 14 weeks it recovered itself and was sweet once more.

In April, 1894, it was at work again, and small quantities of sewage effluent from the precipitation tanks were put on to it at first, and were gradually increased to 500,000 gallons per day as it got into condition, which it did in about five weeks. The analytical results obtained were as under:

	Sewage effluent.	Filtrate.
	Grains per gallon.	
(1) Oxygen absorbed in 4 hours	4.096	0.856
(2) Albuminoid Ammonia	0.416	0.095
(3) Nitrogen as Nitrates	0.1280	0.2378

The quantity per day was then increased to 600,000 gallons for three months, and the following average results were obtained:

	Sewage effluent.	Filtrate.
	Grains per gallon.	
Oxygen absorbed in 4 hours	3.608	0.730
Albuminoid Ammonia	0.396	0.113
Nitrogen as Nitrates	0.0223	0.1414

By this time the method of working the filters to the best advantage was better understood, and the rotation of the fillings was systematized. The filter was filled to the surface in about 2 hours, the sewage effluent remained in it at rest for 1 hour, and the emptying and aerating occupied five hours, thus making a cycle of eight hours. Three cycles a day for five days a week and two on the sixth day were regularly done for eight weeks, there being a rest of 32 hours each week end. An average

of one million gallons per day, calculated over seven days a week, was dealt with in this way, with the following average results:

	Sewage effluent.	Filtrate.
	Grains per gallon.	
Oxygen absorbed in 4 hours.....	4.113	0.935
Albuminoid Ammonia.....	0.382	0.114
Nitrogen as Nitrates.....	0.3956	0.6990

These results were obtained in the winter of 1894-5, when ice formed on the surface of the filter.

The filter is now altered and has a depth of 6 feet of coke breeze filtering material, and the under-drains have been enlarged in size and increased in number. The enlarged filter is used tidally, and has, therefore, two cycles a day. It is filled in 2½ hours, stands full two hours and drains off for 8 hours, but the time allowed is not enough for the filter to clear itself. On the 1st of December last the filter was filled once only, and after standing 2 hours was allowed to drain off for 19 hours. The valves were then shut, and 14 inches of filtrate was found on the bottom. The reduced number of cycles per day and the difficulty of emptying the filter have operated to keep the output of the 6-feet filter at practically the same quantity as the 3-feet filter. The filtrate is clear and inodorous, with a slight iron tinge.

It may be of interest to state that for three months in the spring of 1897 the crude sewage at Barking was not treated chemically. It was passed through the precipitation channels in the same manner as when the lime and iron were added, and some of the solids in suspension settled to the bottom. The 6-feet filter was used during those months for the partially clarified sewage in exactly the same manner as for the sewage effluent from the precipitation process, and with equal results.

The experience gained at Barking led Mr. Dibdin to suggest in 1896 to the Urban District Council of Sutton, in Surrey, of which body he was a member and is now Chairman, the advisability of applying the crude sewage to filters filled with coarse material, and then putting it into fine filters in the same manner as was done with the sewage effluent from the precipitation process. This idea was accepted by the Council and a portion of the sewage was dealt with. This method of dealing with sewage without the aid of chemicals or mechanical precipitation was brought to its present stage by Mr. Dibdin, and is now known as his process. He has not attempted to obtain proprietary rights in it.

Sutton is situate about 12 miles from London and is partly on the chalk and partly on London clay. It has a population of 16,000, of whom 13,000 occupy premises draining to the sewage farm. The dry weather flow of sewage is 400,000 gallons per day. No rain water

SEWERAGE COMMISSION | MENDES COHEN. E.H. HAMBLETON. E.E. BARTLETT.

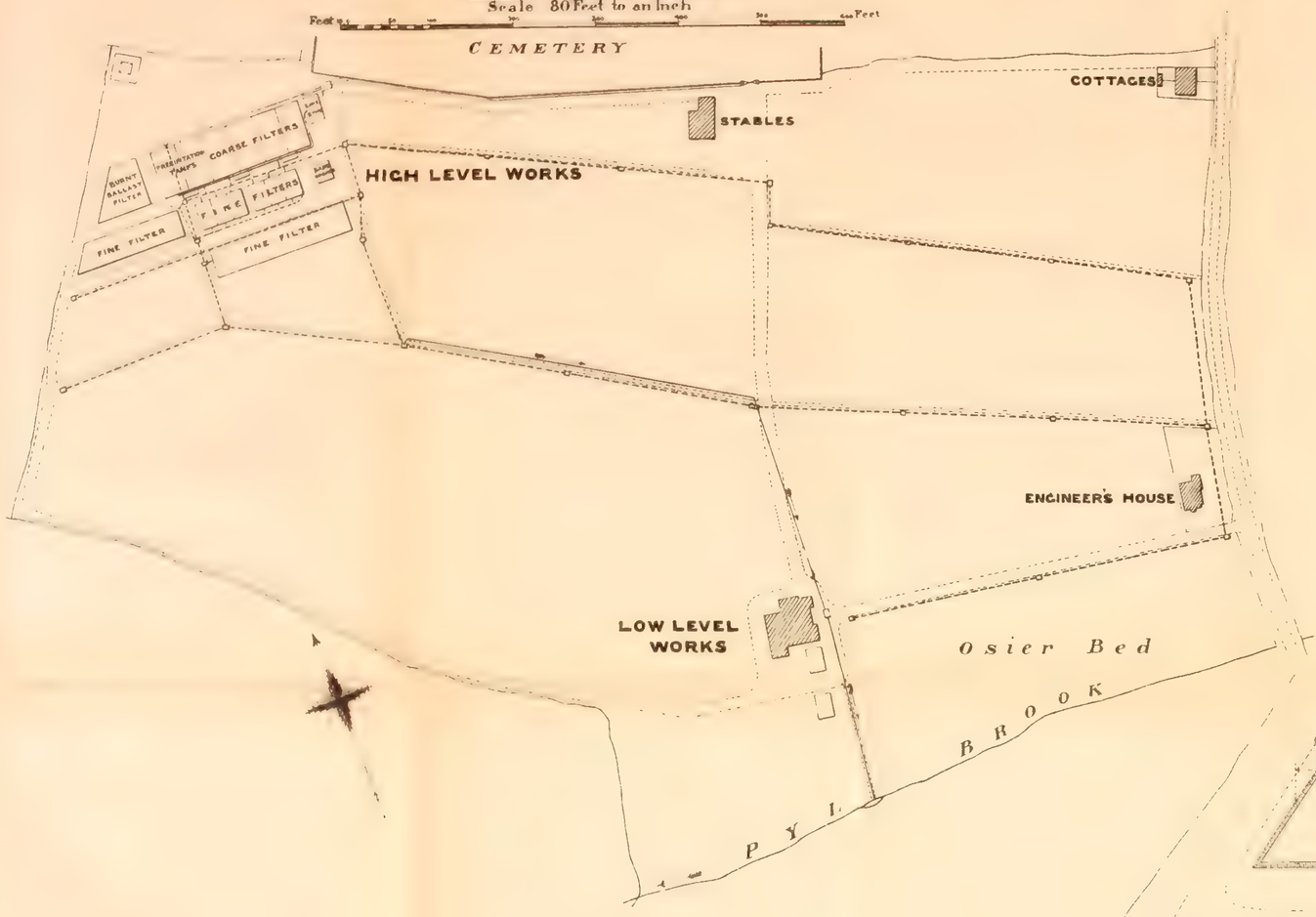
BACTERIAL TREATMENT OF SEWAGE

DIBDIN'S SYSTEM AT SUTTON

BALTIMORE SEWAGE
1899
DRAWING No I

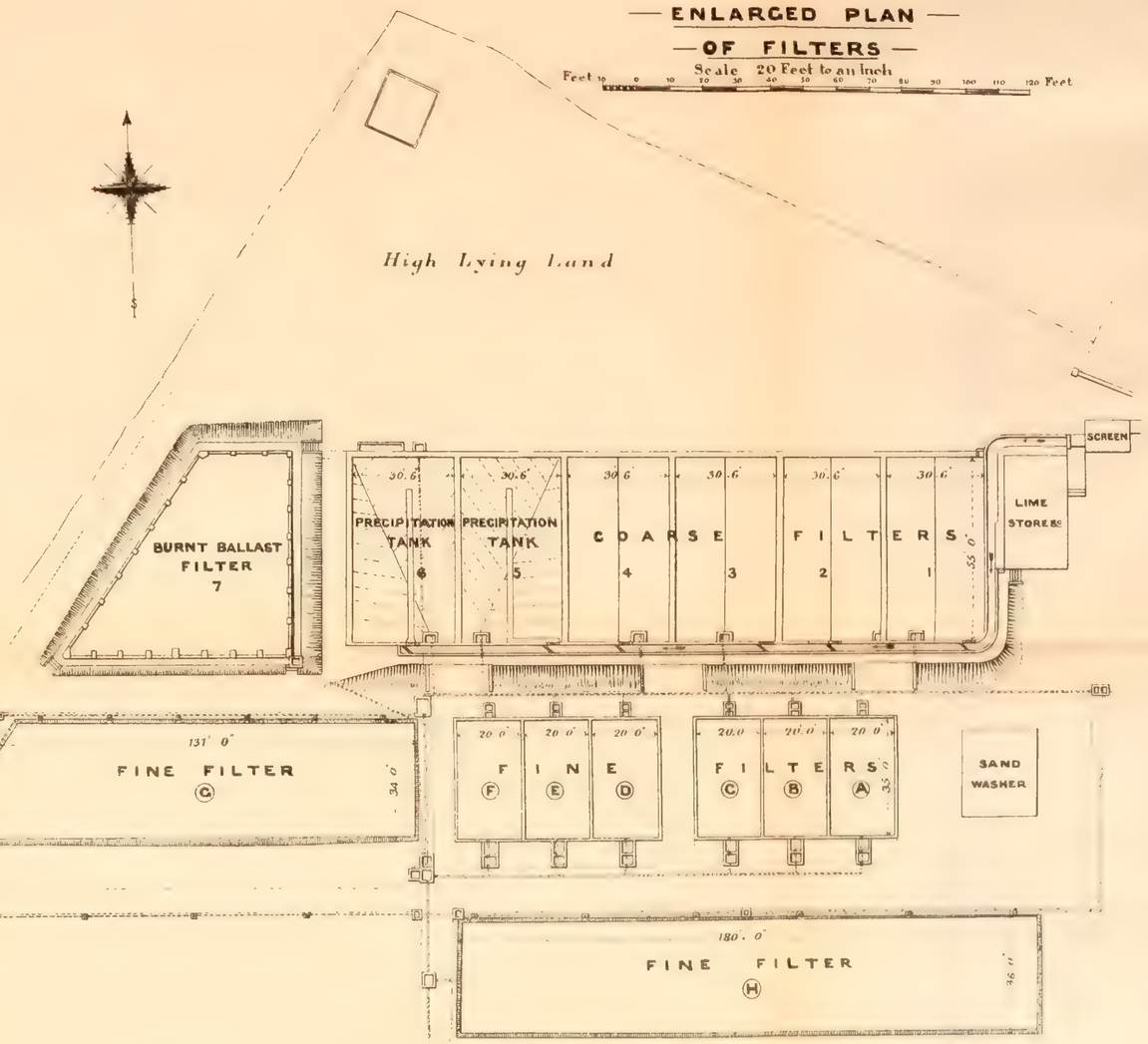
PLAN OF FARM

Scale 80 Feet to an Inch

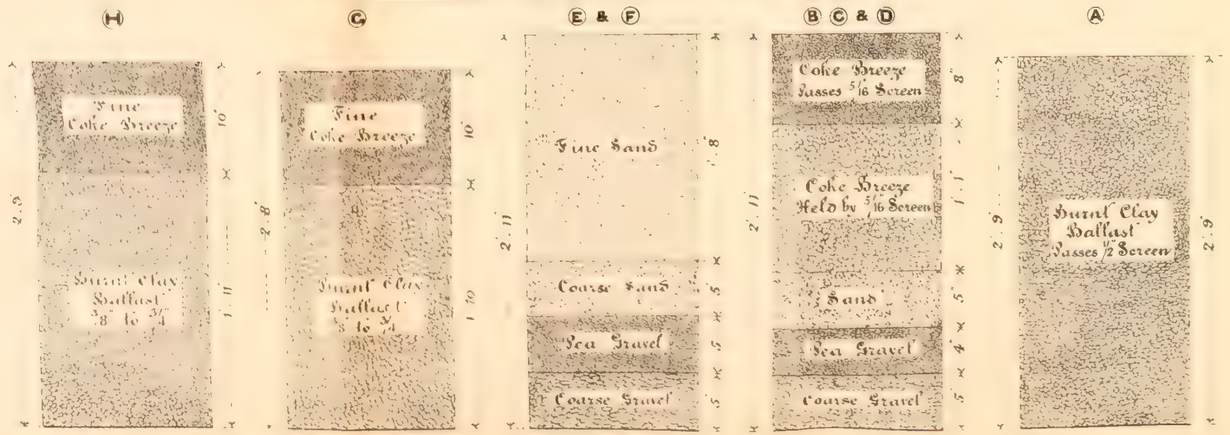


ENLARGED PLAN OF FILTERS

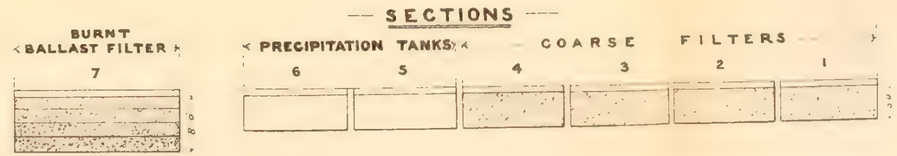
Scale 20 Feet to an Inch



DIAGRAMMATIC SECTIONS OF FINE FILTERS



SECTIONS



FINE FILTERS

Scales for Sections

Horizontal Scale – 20 Feet to an Inch

Vertical Scale – 10 Feet to an Inch

J.W. Shenstone CE
Assistant
11 January 1899

enters the sewers by direct means, but after rain the percolation of subsoil water increases the daily flow, and at times the total rises to 800,000 gallons. The town is thus drained on the separate system, and the sewage is of a domestic and household character in a strict sense. Three-fourths of the quantity flows to the farm by gravitation and the other fourth is pumped into the gravitation sewer near to the tanks.

The farm was laid out and the sewerage works were constructed in 1893. The total area is 25.17 acres, and the land is wholly situate on clay. The scheme was designed as one of chemical precipitation, with filtration of the tank effluent through artificial filters and the application of the filtrate to land. The levels of the farm are such that 15.65 acres can be irrigated with tank-effluent, and 10.27 acres with the filtrate, if desired.*

Six precipitation tanks were originally constructed, each having a water surface of 55 feet by 30½ feet, and a capacity of 50,000 gallons, or 300,000 gallons all told.

The filters were also six in number, each with a filtering surface of 35 feet by 20 feet and a depth of 2 feet 9 inches. The area of each filter is 77 yards, which gives a total of 462 square yards for the six.

In November, 1896, the use of Tank No. 1 for precipitation was discontinued and its use as a coarse bacteria tank commenced. It was at first filled for a depth of 3 feet 6 inches with burnt clay ballast from which the finer parts which passed a three-quarter-inch screen had been taken out, and the depth was increased to 5 feet. The content of the filtering material in this and the other coarse filters is 8,387 cubic feet or 310 cubic yards.

In March, 1897, Tank No. 2 was filled to a depth of 5 feet with burnt ballast in layers of varying coarseness. The bottom 2 feet passed a screen with a mesh of one-sixteenth of an inch. The succeeding layers increase in coarseness until at the top the pieces of burnt ballast are as large as hens' eggs.

Tank No. 3 was also filled in 1897 in the same manner as No. 1, and in 1898 Tank No. 4 was likewise converted.

Tanks 5 and 6 are used for chemical precipitation, as first designed. Nos. 1, 2, 3 and 4 are thus coarse bacterial filters with a total content of 33,548 cubic feet or 1,240 cubic yards.

The whole of the six original filters have been changed into fine bacteria beds, and two others have been added.

Filter A contains 2 feet 9 inches in depth of burnt clay ballast which has passed a half-inch screen and includes the fine stuff, and thus has a content of 1,925 cube feet or 71 cube yards.

*See Plate IX.

Filters B, C and D each contain layers of various materials. On the bottom of each there is 5 inches of coarse gravel, then 4 inches of pea gravel, then 5 inches of sand, followed by 13 inches of coke breeze, which was held back by a $\frac{5}{16}$-inch screen, and not exceeding one inch, and on this the top layer, 8 inches thick of coke breeze, which passed a $\frac{5}{16}$-inch screen. Each has a content of 2,052 cube feet or 76 cube yards.

Filters E and F are made on waterworks lines. The bottom 5 inches is of coarse gravel averaging two inches in size, then follows 5 inches of pea gravel, 5 inches of coarse sand and 20 inches of fine sand as the top layer. These have the same content as B.

Filters G and H are not brick structures like the six just described. Advantage was taken of the fact that the sub-soil was stiff clay, and two excavations were made in it, the material obtained was burned into ballast, and after it was screened part was replaced to form the filtering material. The clay sides and bottom are naturally watertight.

Filter G has a filtering surface 131 feet long and 34 feet wide, or 495 square yards. It has 22 inches of burnt clay ballast ranging in size between $\frac{3}{8}$ inch and $\frac{3}{4}$ inch, and on this there is 10 inches of fine coke breeze, making a total depth of 2 feet 8 inches. The content of filtering material is, therefore, 11,878 cube feet, or 440 cube yards.

Filter H is 180 feet long and 36 feet wide, and has a filtering area of 720 square yards. On the bottom there is 23 inches of burnt clay ballast of the same size as in filter G, followed by a similar 10-inch layer of coke breeze, making a total depth of 2 feet 9 inches. The content is 17,820 cube feet or 660 cube yards.

The fine bacterial filters have a content of 41,883 cube feet or 1,551 cube yards.

In addition to the Dibdin filters just named there is a filter with porous walls having an area of 308 yards, containing 8 feet of burnt ballast in various layers. It was intended to be one of Colonel Ducat's filters, but he is not satisfied with its construction and disclaims it as representing his process.

The whole of the sewage passes through a wire mesh rotatory screen, which thoroughly removes the floating solids and paper.

200,000 gallons per day are treated chemically with 9 grains of lime and 2 grains of protosulphate of iron and passed through precipitation tanks 5 and 6, and the tank effluent is passed either on to the land or through the fine bacteria filters.

120,000 gallons per day are dealt with in the four coarse bacteria filters, and then passed to the land or into the fine filters.

80,000 gallons per day are passed through the so-called Ducat filter, and then on to the land or into the fine filters.

When the infiltration of rain water into the sewers raises the quantity, each of the above proceses receives its proportion, but the excess does not in any case exceed double the dry weather flow.

The working of the Dibdin filters is as simple as can be.

On the top of the filtering material in the coarse filters there is a shallow distributing channel into which the screened crude sewage is turned, and from which it overflows into the burnt ballast. When the liquid rises to within an inch or two of the top, the sewage is diverted into another filter. The charged filter is allowed to stand full for two hours and then the outlet valves are opened and the contents discharged. The air passes freely into the filter as the liquid is discharged and a period of 2 or 3 hours is given for aeration, after which the filter is then ready for use again.

The operation of the fine filter is identical with that of the coarse one.

The liquid which is discharged from the coarse filter is turbid and has a modified sewage odour when shaken up.

The filtrate from the fine beds is slightly opalescent for the first few minutes of the discharge, but it then clears itself and is bright and inodorous.

The filters deal with the whole of the constituents of the sewage without producing sludge or any bye-products, and the following list of average results abstracted from the analyses of Mr. Dibdin show the changes effected:

Results stated in grains per gallon.

For 7 weeks ending 29th March, 1897.

	Crude sewage.	Coarse bed filtrate.	Fine bed filtrate.
Suspended matters	35.40	2.65	0.954
Chlorine	7.45	6.41	6.00
Oxygen absorbed in 4 hours	4.025	1.717	0.608
Nitrogen as Nitrates	0.003	0.424	1.413
Nitrogen as Nitrites	0.030	0.210	0.043
Free Ammonia	6.635	2.180	0.237
Albuminoid Ammonia	0.725	0.298	0.158

For 7 weeks ending 24th May, 1897.

	Crude sewage.	Coarse bed filtrate.	Fine bed filtrate.
Suspended matters	84.66	2.91	0.497
Chlorine	8.51	7.47	7.56
Oxygen absorbed in 4 hours	3.546	1.452	0.620
Nitrogen as Nitrates	0.000	0.399	0.723
Nitrogen as Nitrites	0.001	0.120	0.048
Free Ammonia	4.778	2.027	1.154
Albuminoid Ammonia	0.786	0.360	0.178

In connection with one of my own schemes I had occasion to secure the services of the eminent chemist, Sir Edward Frankland, F.R.S. etc., and he personally took samples of the crude sewage, and the filtrates in January, 1898.

With the consent of my clients I set out his analyses hereunder:

Results expressed in parts per 100,000.

	Crude sewage.	Coarse bed filtrate.	Fine bed filtrate.
Total solid matters	96.2	84.6	96.1
Suspended matter—			
Mineral	20.0	Turbid	Turbid
Organic	53.8	Turbid	Turbid
Organic Carbon	4.458	1.514	.989
Organic Nitrogen	.898	.308	.173
Ammonia	7.0	2.0	.82
Nitrogen as Nitrates and Nitrites	.0	1.011	2.645
Total Combined Nitrogen	6.663	2.966	3.493
Chlorine	11.6	8.5	11.2

I requested Sir Edward to furnish me with his opinion as to whether the results were within the standards set up by the Royal Commission appointed in 1868 to inquire into the best means of preventing the pollution of rivers, of which he was a member, and he replied: "You will see that the final effluent of the aerobic filter is, in every respect, well within the Rivers Commission standards. The nitrification has been very energetic whilst the raw sewage was above average strength. I collected the samples myself."

As an illustration of the times of working the coarse filters I may say that during August, 1898, Nos. 1 and 2 were in use 27 days and were each charged 81 times; No. 3 was in use 21 days and was charged 63 times, and No. 4 was in use 31 days and was charged 93 times; that is, 3 times per working day.

The three cycles of each coarse filter are as follows:

	H. M.
Filling	0—20.
Standing full	2— 0
Emptying	0—45
Aerating	2— 0
Total	5— 5

or a total of 15 hours 15 minutes—and for the remainder of the day the filter is recuperating.

The cycle of the fine filters is similar to that of the coarse ones.

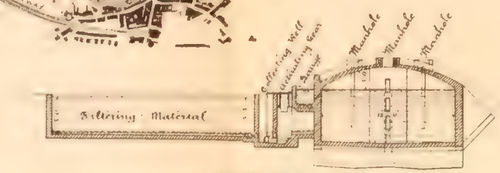
BACTERIAL TREATMENT OF SEWAGE

SEPTIC TANK – EXETER

BALTIMORE SEWAGE
1899
DRAWING Nº2

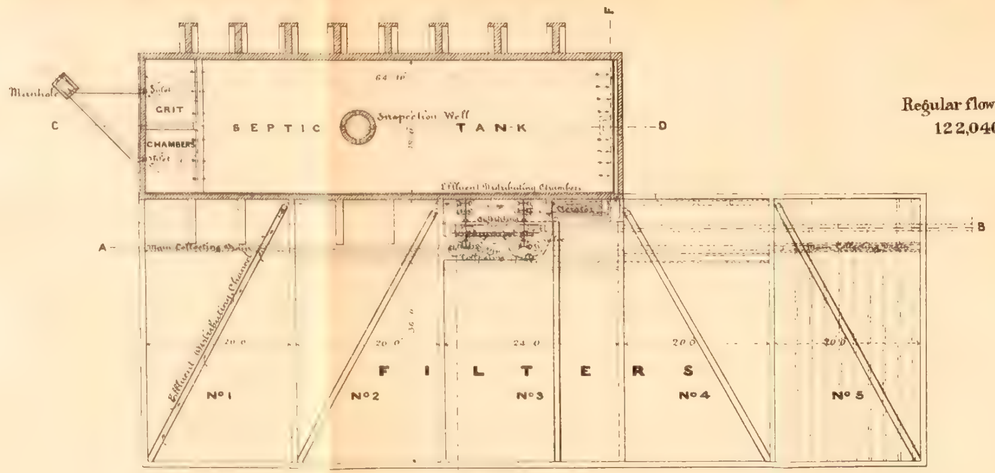
— Plan of the —
CITY OF EXETER

Only the hatched portion of the City is drained to the Septic Tank installation.

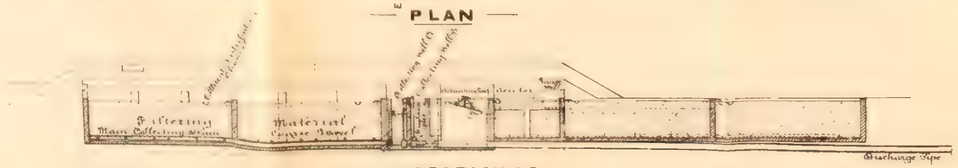


— SECTION E.F —

— SECTION C.D —



— PLAN —



— SECTION A.B —

— Scale of Feet —

Feet 10 5 0 10 20 30 40 50 60 70 80 Feet

SEWERAGE COMMISSION { MENDES COHEN. F.H.HAMBLETON. E.L.BARTLETT.

Dry Weather Flow
31,380 gallons per day.

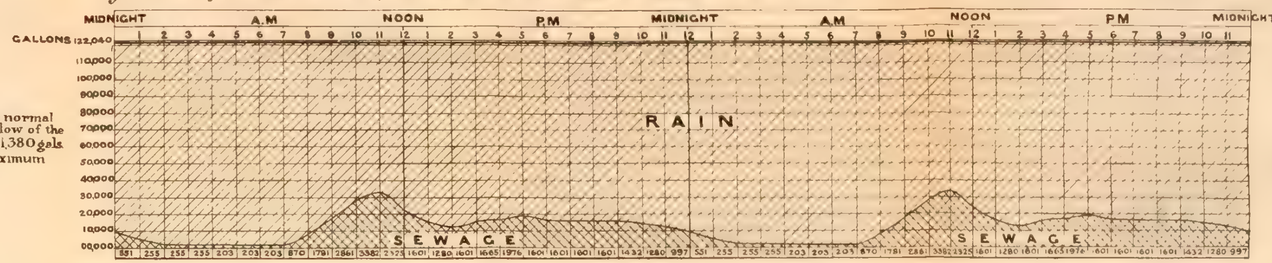
Explanation
The black in the Diagram represents the times when the filters are charged with sewage – thus in Nº1 the sewage is turned in at midnight and gradually rises until at 10.5 a.m. the filter is full. It remains at rest until Nº2 is full at 1.10 p.m. and then discharges in the next two hours. This is shown graphically by the shape of the black portion.

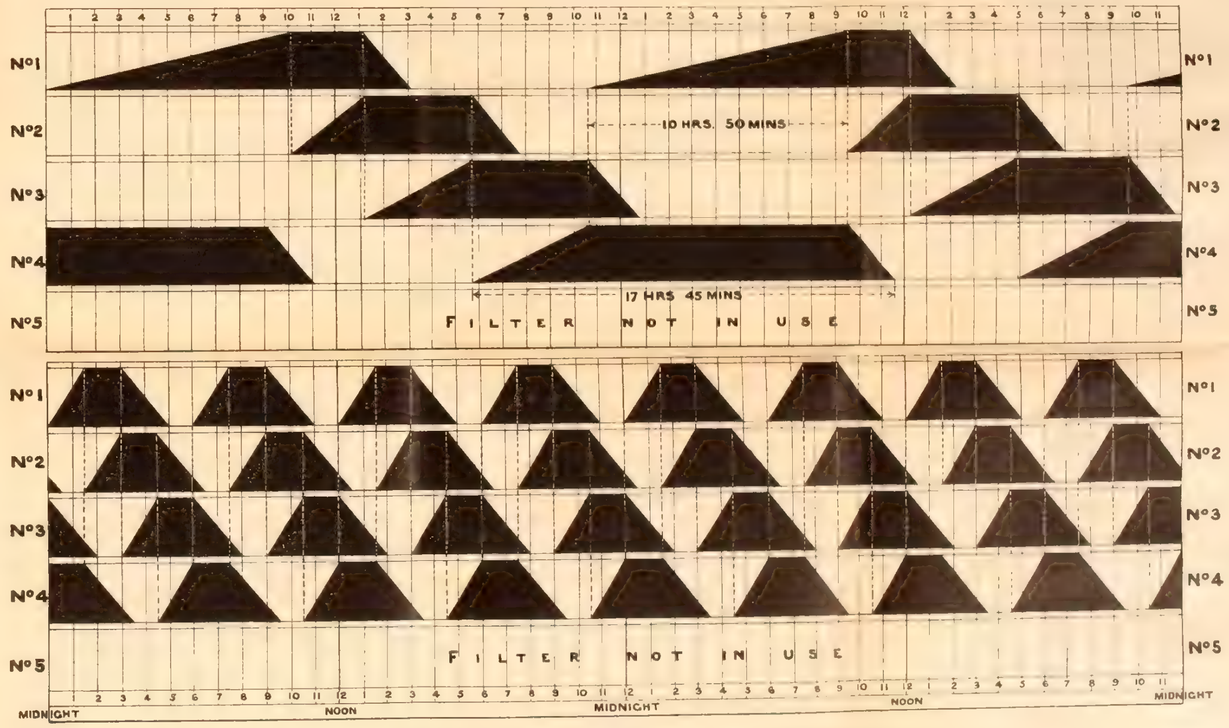
Regular flow of Sewage and Rain,
122,040 gallons per day.

— NOTE — *The Diagrams show the Rotation of the Filters for 48 hours when dealing first with a daily dry weather flow of 31,380 gallons or 5020 cubic feet and then with a regular daily flow of sewage and rain amounting to 122,040 gallons or 19,526 cubic feet. The solid cubic content of Four Filters to the top of the filtering material is 14400 cubic feet and the interstitial space occupied by the sewage is taken to be 4800 cubic feet or one third of the solid content.*

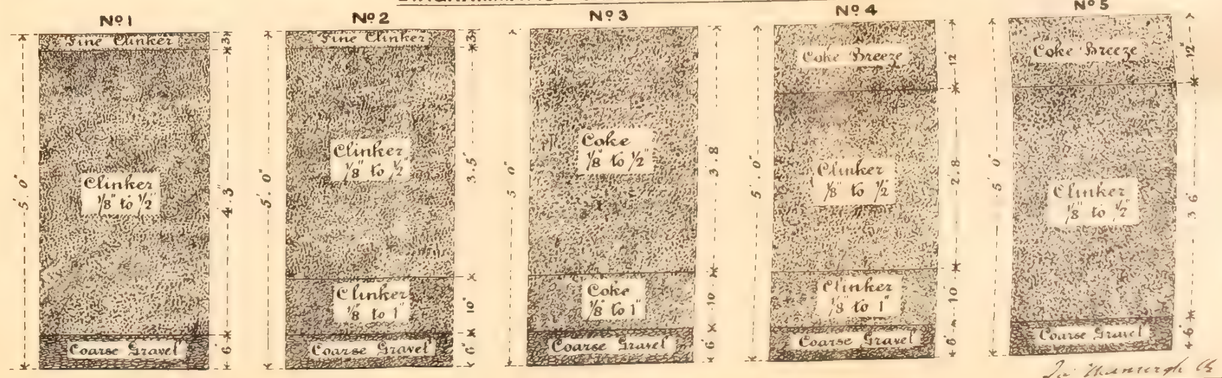
— ROTATION OF FILTERS —

DIAGRAM showing the normal variations in the daily flow of the dry weather sewage of 31,380 gals per day and also the maximum daily flow during rain.





— DIAGRAMMATIC SECTIONS OF FILTERS —



J. Thomas Clark C.E.
Westminster
11th January 1911

Coarse filter No. 1 was put into action in November, 1896, and, to the end of November, 1898, has been charged 1,625 times, on an average of 2¼ times per day.

Coarse filter No. 2 was put into action in March, 1897, and, to the end of November, 1898, has been charged 1,156 times, on an average of 1.9 times per day.

Coarse filter No. 3 was started in July, 1897, and, to the end of November, 1898, has been charged 1,097 times, on an average of 2.21 times per day.

Coarse filter No. 4 was started in April, 1898, and, to the end of November, 1898, has been charged 583 times, on an average of 2.71 times per day.

At the outset the water content of the coarse filter was 32 per cent. of the content of the tank to the top of the filtering material, but it has by use deteriorated to 19 per cent.

The water content of the fine filters may be taken at 33 per cent., and does not vary when once the filter is in condition.

There is no accumulation of sludge in any of the filters, and when dug into there is no appearance of any sewage matters, and the odour is only that of damp earth.

The differentiation of the layers and filtering materials does not appear to be an advantage.

The coke breeze appears to be the more suitable material for the fine filters, but it is not much superior to burnt ballast.

The experience at Sutton shows that the coarse filters deal with 95 gallons per cubic yard per day of filtering material, and the fine filters with 208.4 gallons.

Cameron's Septic Tank.

On Drawing No. 2* I have shown a plan of the City of Exeter, and have hatched the district of St. Leonards thereon. The St. Leonards district is within the city boundaries, but it has a set of sewers independent of the sewers which drain the other and more important parts of the city. The total population of Exeter is about 38,000, of which 1,500 reside in St. Leonards.

The experiments on sewage treatment by the septic-tank process, conducted by the city authorities under the direction of Mr. Donald Cameron, the City Surveyor, have been made with the sewage of the St. Leonards district only. In 1896, after a small experiment with part of the sewage, the whole of the dry weather flow and part of the

*Plate X.

rainfall was dealt with by the installation at present working, and which is shown on the drawing.

The sewage is wholly domestic and in dry weather amounts to 31,380 gallons per day.

The main sewer is 24 inches in diameter, and previous to the septic tank treatment the sewage was discharged from it into the River Exe in a crude state.

In order to divert the sewage to the septic tank, a small sump is sunk in the 24-inch sewer, 8½ inches below the invert, and immediately on the down-stream side a weir 8 inches high is built across the sewer.

From the bottom of the sump a 6-inch drain is laid on the right hand of the sewer looking down-stream, discharging into a covered manhole adjoining the main sewer, in which there is a detritus chamber 4 feet square and 18 inches deep below the invert of the drain, for the collection of grit and mineral substances. This manhole is connected to the septic tank by a 6-inch drain 155 yards long, with a gradient of 1 in 1,000 and a maximum discharge by careful gauging of 122,040 gallons per day.

The works described completely divert the whole of the dry weather flow of sewage without any screening to the septic tank, and also the rainfall up to three additional volumes, any excess of rain overleaps the weir in the sewer and flows direct into the river.

Close to the septic tank there is a small shallow distributing chamber from which two separate 6-inch drains convey the sewage to the tank itself.

The septic tank is a covered rectangular structure, with a slightly sloping bottom, vertical walls and segmental roof. Its internal length is 64 feet 10 inches, its breadth is 18 feet, and the mean depth of sewage when working normally is 7 feet 4½ inches. The bottom slopes 3 inches transversely from the walls to the centre, and 6 inches longitudinally from the outlet to the inlet end. At the inlet end the depth is 7 feet 6 inches at the side walls and 7 feet 9 inches in the centre, and at the outlet end 7 feet at the side walls and 7 feet 3 inches at the centre. The normal level of the sewage is at the springing of the arch, which has a versed sine of 3 feet.

At the inlet end of the tank there is a transverse division wall 7 feet from the end, the top of which is twelve inches below water-level. The space so formed is divided into two equal parts by a division wall on the longitudinal axis of the tank, the top being 6 inches below water-

level. These two enclosures are known as the grit chambers and have a depth of 10 feet.

In the centre of the tank there is a covered inspection well. The bottom of the well is level with the bottom of the tank, and its mouth is at the top of the roof. In its sides are stout glass windows, and its only purpose is to afford facilities for inspecting the action of the process on the sewage.

There are also three manholes in the roof for access to the tank itself and also six small 3-inch holes for sampling. The manholes and sampling places are covered.

Although the tank is not, strictly speaking, gas-tight, yet there is no free communication from the inside with the air and light.

The two 6-inch drains which come from the shallow manhole go into the grit chambers, one to each. Their inverts are at normal water-level, but both pipes are continued downwards for five feet, so that the incoming sewage is discharged that depth below the surface.

At the outlet end of the tank the discharge pipe is fixed on a ledge on the wall 16½ inches below the water. The pipe is slotted and extends the whole width of the tank. The outlet is, of course, turned up 16½ inches, and at the beginning it discharged direct into the aerating chamber. A small sedimentation chamber was added to the tank in July, 1898, for the purpose of arresting the matters which appeared on the surface of the filters as scum, and into this chamber the sewage from the septic tank now flows before it goes to the aerator.

The water content of the septic tank is 53,800 gallons.

The aerator chamber contains a V notch for gauging the flow of sewage, and after passing it the sewage flows into a shallow trough 7 feet long and falls over the sides into the pipes which distribute it onto the filters.

There is no screen for arresting the solids on any part of the works.

There are five filters having an area of 80 square yards each. The walls are vertical and the bottom flat, with a fall of 3 inches toward the outlet end. In each there is an average depth of 5 feet of filtering material.

On the bottom of the filters there are 3-inch collecting drains, laid parallel to each other, and over and between them there is a layer of coarse gravel following the slope of the floor 6 inches thick. In all other cases the filtering layers are level on their top surfaces.

No. 1 filter is filled above the gravel with broken clinker which passed a half-inch screen and was held by an eighth-inch screen, but the top 3 inches is of finer stuff.

No. 2 filter is the same as No. 1, save that the first 10 inches of clinker above the gravel is coarser than the rest, having passed an inch screen and being held by an eighth-inch screen.

No. 3 filter has above the gravel 10 inches of coke breeze which passed an inch screen, and then 44 inches, that is, to the top, with coke breeze which has passed a half-inch screen.

No. 4 filter has above the gravel a 10-inch layer of clinker which passed a one-inch screen and was held by an eighth-inch screen, then 32 inches of clinker which passed a half-inch screen and was held by an eighth-inch screen, and then 12 inches of coke breeze which passed a half-inch screen.

No. 5 filter has above the gravel 42 inches of clinker which passed a half-inch screen and was held by an eighth-inch screen, and then 12 inches of coke breeze which has passed a half-inch screen.

A semi-circular distributing pipe is embedded on the filtering material in each filter, with its top level with the surface. In filters 1, 2, 4 and 5 this pipe is laid diagonally, but in filter 3 it is parallel to the long sides.

The effluent drain from the outlet wells is level with the bottom of the filters and discharges direct into the river.

There is an ingenious automatic alternating gear which is operated by an overflow from the filters. When a filter is fully charged, some of the filtrate overflows and fills a tilting basin, which closes the outlet valve of the filter which is next to be filled, opens the inlet valve of the same filter, shuts the inlet valve of the filter which has just been charged, and opens the outlet valve of the filter which is to be discharged.

The working of the process is simple and automatic.

The sewage from the main sewer passes into the grit chambers and then into the septic tank, and overflows therefrom into the shallow trough. In dry weather the sewage was in the tank about 40 hours when it was first put to use. A deposit on the bottom of the tank has taken place at the rate of 1¼ inches per month, and after 26 months' continuous work there is a total depth of 35 inches. On the surface of the sewage there is a layer of scum 2 inches thick which gathered in two months after the start, which increases in winter and decreases in summer. The space between the top of the deposit and the under side of the scum layer is that through which the sewage passes.

There is a constant rising of gas bubbles from the bottom to the surface, carrying with them small particles of solids, which fall off as the bubbles rise.

The gases generated rise into the space between the scum and the roof, and escape through the concrete when they are not used for lighting, or are liberated by the removal of the covers for inspection. There is no pressure in the tank at any time, even when no means are taken to draw off the gases.

The tank effluent in the shallow trough is apparently putrefying, and a slight smell is to be observed there.

The filters are used in combinations of four. The tank effluent is turned into each in rotation and fills the interstices to the top of the filtering material, and is then automatically diverted into another filter. The filter which is filled is allowed to rest full until the automatic gear is next operated by the filling of the next filter, when the outlet valve is opened and the liquid is discharged into the river. The filter is then allowed to rest for a time, which is determined by the rate of flow of the sewage, and is then filled again and the cycle is repeated.

The working of the filters is such that every fifteen or sixteen days one of the five has two or three days' complete rest.

When the filtering material was first put in, the water space was 38 per cent. of the bulk occupied, but during use this diminishes to 26 per cent. After the two or three days' rest, however, it recovers itself, but not quite to 38 per cent. A fair mean of the whole time of use would be 33⅓ per cent.

A scum gradually accumulates on the surface of the filters, and is removed once or twice a year by taking out the filtering material to a depth of 2 inches.

The present installation commenced work on the 21st August, 1896, and has gone on uninterruptedly until to-day.

The detritus manhole near the outfall sewer has been emptied from time to time, and about one cubic yard of mineral matter taken out. When this is done the deposit is stirred up so as to send all the organic matter to the tank.

The two grit chambers in the tank have not been emptied.

Except the mineral matter, the installation has dealt with the whole of the sewage of the St. Leonards district and a proportion of the rainfall up to a total of 122,000 gallons per day, and disposed of it, except the deposit and scum in the tank.

The first rush of the filtrate is opalescent, but it soon becomes clear and bright, and is without smell.

The analytical results of the process are as follows:
By Dibdin and Thudichum. (April and June, 1897.)

Results in grains per gallon.

	Crude sewage.	Tank effluent.	Filtrate.
Suspended Solids.			
Mineral	10.0	3.5	Practically
Organic	14.5	7.8	nil.
Dissolved Solids.			
Mineral	14.0	16.1	20.3
Organic	15.9	14.6	24.2
Chlorine	5.0	5.1	5.3
Oxygen absorbed in 4 hours	2.028	1.405	0.388
Nitrogen as Nitrites	.....	.....	0.253
Nitrogen as Nitrates	.....	.....	0.353
Free Ammonia	3.778	2.763	1.705
Albuminoid Ammonia	0.212	0.175	0.078

Another series of analyses by Messrs. Pearmain and Moor are set out hereunder:

Results in grains per gallon.

Averages of six samples of each.

	Crude sewage.	Tank effluent.	Filtrate.
Total Solids	57.1	37.67	31.5
Mineral Matter	28.3	24.5	24.83
Loss on Ignition	28.83	13.17	6.67
Chlorine	6.05	4.51	4.51
Oxygen Absorbed	4.21	1.41	0.32
Nitrogen as Nitrites	.....	.....	.....
Nitrogen as Nitrates	.....	.....	0.91
Saline Ammonia	4.36	2.83	1.19
Albuminoid Ammonia	0.74	0.40	0.11

Yeovil Septic Tank.

Visit 8th November, 1898.

The sewer from which the sewage passed through the septic tank is obtained, conveys one-sixth of the whole of the sewage of the borough, and of this one-sixth about one-quarter only is intercepted; that is to say, the quantity treated is actually one-twenty-fifth of the town's sewage. The sewer selected conveys an average quality of the town's sewage, and was chosen for that reason.

There is a large admixture of liquid trade refuse with the sewage, consisting in the sewer tapped of brewery refuse, the waste from leather-staining and dyeing, etc. The chemicals used by the traders include large quantities of red arsenic, sulphates of copper, iron and zinc, alum, salt, potash, lime, hydroleine and vegetable colouring.

The sewer containing the one-sixth of the sewage is 21 inches in diameter, and is tapped at a manhole by a 6-inch pipe, having its invert level with that of the 21-inch pipe. The centre line of the 21-inch sewer is straight in plan, but on the left-hand side of it, looking in the direction in which the sewage is flowing, the 6-inch drain branches off, having its mouth in the same face of the manhole as the down-stream part of the 21-inch sewer. The mouths of the sewers are within six inches of each other. In order that there may be diverted into the 6-inch drain a proper proportion of the floating solids, a board two inches deep is placed in the manhole at an acute angle across the 21-inch sewer, with its top level with the soffit of the 6-inch sewer. The upstream end of this board is against the right hand side of the channel in the manhole, and its down-stream end is fixed against the manhole wall between the two sewers. There is thus a space below the bottom of the board, varying from nothing at the ends to four inches in the centre, through which the sewage flows to the 21-inch sewer in an unobstructed manner. When the depth of sewage flowing in the 21-inch sewer is above the bottom and below the top of this board, the whole of the solids floating on the surface are diverted into the 6-inch drain. At other times there is a rough division of the quantity between the sewers, but the proportions cannot be stated with accuracy.

There is a manhole on the 6-inch drain about 15 feet from the septic tank, in which the grit partly subsides. This is cleaned out from time to time by hand, care being taken to vigorously stir the deposit so as to free it from organic matters. The deposit removed is lying alongside the manhole and is mineral matter. In this manhole there is an overflow pipe discharging into the continuation of the 21-inch sewer.

The effect of the intercepting arrangements described is that the flow of sewage into the tank is at a fairly even rate all the day. When rain occurs, the greater part of the increased quantity in the main sewer flows over the board into the 21-inch sewer at the first manhole, and what little of it is forced through the 6-inch drain by the increased head in the manhole is spilled by the overflow in the second manhole.

The septic tank is roofed over with a brick arch, and has a flat bottom, vertical walls, and is more or less air-tight.

It has an internal length of 50 feet, a breadth of 12 feet and a depth of sewage of 6 feet. At the inlet there is a transverse cross wall 5 feet 6 inches from the end, and the space so formed is divided into two by a central wall; and both of these walls have their tops about 2 inches below water-level. The two spaces so formed are called grit chambers.

Each of these grit chambers receives one of the two 6-inch sewers which leave the second manhole, and the inlet pipe is continued down-

wards to within 2½ feet of the bottom. The level of the sewage in the tank is the same as the inverts of the 6-inch sewers, where they enter the tank wall just where the descending pipes commence. The septic tank, including the grit chambers, holds 22,000 gallons of sewage when working normally.

The outlet from the tank consists of a 5-inch slotted pipe laid on a bench on the end wall furthest from the inlet, about 16 inches below the sewage level, and discharges into a small measuring well or manhole outside the tank.

The filters are now six in number and have a surface area of 240 square feet each, and a depth of 3 feet, which equals a total of 160 square yards in area and of 160 cubic yards in content.

There is an automatic gear for opening and shutting the valves which admit the tank effluent to the filters, and the filter effluent into the Dodham Brook, adjoining the works. These valves are actuated by the overflow of the tank effluent from the filter which is being filled passing into a bucket-tilting arrangement, which diverts the tank effluent to an empty filter, and liberates the water in the filter which has been standing charged. Two of the filters are out of use for aeration and recuperation in regular rotation for three days, at intervals of six days; that is to say, four filters are actually doing the work at any given time.

When the works were first started in September, 1896, the 6-inch sewer delivered 22,000 gallons per day to the tank. The filters were then three in number, each of which was subsequently divided into two, making the present six, so that the total area and content at the outset were slightly in excess of the present ones by the area and cubic content of the new division walls.

The material in the first filters was coke of a rather coarser nature than is now used for filtration, varying in size from 1¾ inches to buckshot pieces.

The original arrangement was in use from September, 1896, to February, 1898, or 17 months.

It was found in practice that with three filters, one of which was recuperating, it was necessary to discharge the others without any period of standing full, and this, together with the coarseness of the filtering material, told against the quality of the filtrate.

Accordingly, in February, 1898, the works were thrown out of use and the filtering material removed. There was no accumulation of sludge or deposit on the bottom of the filters or on the filtering material.

The filters were each divided into two by a central longitudinal

division wall, and refilled with carefully selected fine filtering material, as under—

No. 1 Filter—Broken clinker with a layer of chalk.
" 2 " —Broken coke.
" 3 " —Broken coke.
" 4 " —Locomotive smoke-box cinder.
" 5 " —Broken clinker.
" 6 " —Broken clinker.

The depth of 3 feet was not altered. Across each filter in a diagonal direction there is a semi-circular distributing pipe bedded to the lip in the filtering material.

On May 21st last the new filters were put into use. All the other works, such as the tank, the 6-inch sewers, etc., were not altered in any way.

By the new arrangement each filter has a quiescent time of one hour, at least, when full, and this, together with the finer materials, has resulted in an improved effluent.

The grit chambers have been cleared of mineral matters four times since September, 1896, but the total amount of deposit in the septic tank is only one inch from the commencement to date.

The stream into which the effluent is discharged shows no fungus at the outlet.

The experience of the Council has determined them to apply this system to the whole of the sewage of the town, and a scheme for doing this is in operation.

The ratio of one day's flow as the capacity of the septic tank, will be followed in the new scheme, but the ratio of filtering capacity in relation to the dry-weather flow will be somewhat increased.

Lowcock's Aerated Bacterial Filters.

The original experiments by Mr. Lowcock of forcing air into an artificial filter to assist in the treatment of sewage were made at Malvern Link in 1892, but his later and more matured trials have been made at Wolverhampton and Tipton.

The Malvern Link Experiments tended to show that a quarter of a million gallons of crude sewage could be dealt with on a filter having an area of one acre, but that there was considerable difficulty from the clogging of the surface. The experiments with tank effluent after the crude sewage has been chemically treated were freer from difficulty, however, and the installations at Wolverhampton and Tipton deal with tank effluent only.

In 1894 a sand and gravel filter was made on Mr. Lowcock's system at the Wolverhampton Sewage Works with an area of 12 square yards and of the following section. The bottom layer is 6 inches deep and consists of one-inch pebbles, and in it are the underdrains. On it 6 inches of ½-inch gravel is laid, followed by 3 feet 9 inches of gravel and dolomite chippings averaging ¼ inch in size. On the top of the chippings the perforated air pipes are laid, and they are surrounded and covered by 6 inches of one-inch pebbles. There then follow three layers of gravel and sand each three inches deep, thus making a total depth of filtering material of 6 feet. It will be seen that the air pipes are 15 inches below the surface.

The air was driven into the filter at a pressure of 3 inches of water by a Root's blower.

After the crude sewage had been treated with lime the tank effluent was applied to the filter at the rate of 1,000,000 gallons per acre. For the first month nitrification proceeded slowly, but the efficiency of the filter gradually increased until after one year's working the following results were obtained:

Results stated in parts per 100,000.

	Tank effluent.	Filtrate.
Chlorine (grains per gallon)	14.0	16.8
Oxygen absorbed	1.7	0.4
Nitrates	Traces	2.68
Free Ammonia	4.0	1.20
Albuminoid Ammonia	0.35	0.07

The tank effluent had been applied continuously to the filter in an even stream, except that once a week the surface was allowed to dry and it was then raked over, and at intervals of 8 weeks the top ⅛ inch of sand was removed to get rid of a fungus growth, which gradually developed and clogged the filter.

At the end of twelve months the experiment with this particular filter was abandoned and it was then found that the top inch of sand was discolored and dirty, but otherwise the filtering material was sweet.

The whole of the sand and gravel was removed and the following arrangement of coke filtering was placed in its stead.

The bottom layer is six inches deep and consists of broken coke about one inch in size, and in it are the under-drains. On this there is 6 inches of finer coke and then 3 feet 9 inches of fine coke breeze of, say, ⅛-inch pieces. The perforated air pipes lie on the surface of the 3 feet 9 inches bed and are covered with 6 inches of one-inch coke, followed by two three-inch layers of coke and a top layer of sand three inches deep.

The coke filter is thus a repetition of the sand and gravel filter as regards the depths and sizes, save that in both the top 3 inches is of sand.

Two years' working of this filter gave pratically the same output and results as the sand and gravel filter.

In 1896 Mr. Lowcock constructed two filters at Tipton,* where the sewage is first treated with lime and alum. The area of each is 16 square yards and the total depth of filtering material is 3 feet 6 inches. The bottom 6 inches consists of one-inch pebbles and contains the under-drains, and on it there is 6 inches of coke breeze of half-inch pieces. Then comes 15 inches of fine coke breeze and limestone of one-quarter-inch pieces, and on this the perforated air pipes are placed. Above the pipe there is a 6 inch layer of one-inch pieces of coke, then 6 inches of fine coke breeze and limestone, and the top 3 inches is fine sand.

The perforated pipes are 15 inches below the surface, as in the other filters.

When the filters were first put into use, tank effluent was applied at the rate of 120 gallons per square yard per day (580,800 gallons per acre), and the quantity was gradually increased to double. The air is supplied to the filter at a pressure of one inch of water.

While the filters were used for 24 hours each day, some trouble was experienced from the clogging of the surface and a change was made by using them for 12 hours only, and applying as much tank effluent in that time as was previously put into the filters in 24 hours when they were worked continuously. That is to say, in 12 hours the tank effluent was applied at the rate of 2,323,200 gallons per acre, and allowing for the 12 hours rest, the output for 24 hours was 1,161,600 gallons per acre.

The analytical results are shewn hereunder, the figures given being the averages of 8 samples taken from January to September, 1897, and analyzed by Dr. Reid, the Medical Officer of Health for Staffordshire.

Results in grains per gallon.

	Tank effluent.	Filtrate.
Solids in Solution	79.62	80.75
Solids in Suspension	1.75	1.37
Chlorine	10.25	10.07
Oxygen absorbed in 4 hours	0.708	0.223
Nitric Nitrogen	Nil.	0.74
Free Ammonia	1.075	0.277
Organic Ammonia	0.231	0.056

Mr. Lowcock's experience is that there is little to choose between coke, coal, gravel or broken stone as the filtering material, but he attaches importance to its being sufficiently fine and properly arranged,

* See Plate XI.

The Ferozone-Polarite Process.

By common consent the sewage disposal works at Chorley, Lancashire, are the best example of the International Company's Ferozone and Polarite process at the present time.*

The population of the borough is 25,000, of whom 22,000 contribute to the sewage works, which are about one mile from the town and are situated on 6 acres of land, which were formerly used as part of the sewage farm. In the town there are about 1,800 water-closets and 2,500 tubs or pails. The latter when filled with excreta are conveyed in covered vans to a central depot, where the pail stuff is given away to farmers when they will take it, but in harvest times, when the hay crop is being gathered, and during wet weather they do not come for it, and it is then turned into the sewers at the depot in the town after admixture with a small quantity of disinfectant.

The town is supplied with water from the Liverpool works, and I am informed that the daily user per head averages 17 gallons. Very little manufacturing refuse is turned into the sewers; the principal being from a small tannery.

The road and roof and yard drains are connected to the sewers, and a small brook called the River Chor discharges into them, but its contribution does not exceed 125,000 gallons per day.

The outfall sewer from the town is tapped near the works by a branch pipe leading to the precipitation tanks, and the dry water flow of 800,000 to 960,000 gallons per day is regularly and systematically dealt with. About 6,000,000 gallons per day, all told, come to the works during wet weather, which is chemically treated in the tanks, but is not all passed through the filters.

There are eight precipitation tanks 90 feet x 47 feet 6 inches x 6 feet, holding 160,000 gallons each, or 1,280,000 gallons all told. This is about one and a half days' dry weather flow.

The chemicals used were formerly Ferozone and now Ferral in the proportion of about 10½ grains per gallon, including the storm waters.

The sewage after admixture with the chemicals is allowed to stand in the tanks at rest from 2 to 2½ hours.

The sludge is pressed, 45 tons of cake per week being turned out and sold to farmers.

There are 15 polarite filters, each 55 feet 6 inches x 15 feet=92 square yards, or 1,380 square yards in all.

The tank effluent flows into a covered distributing channel, rectangular in section, which extends the whole length of the filters.

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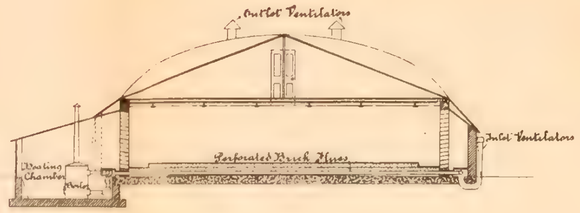
*See Plate XI.

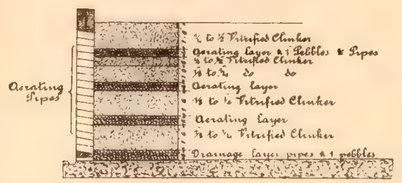
SEWERAGE COMMISSION | MENDES COHEN. F.H.HAMBLETON. E.L.BARTLETT.

DUCAT'S BACTERIAL SELF ACTING FILTER

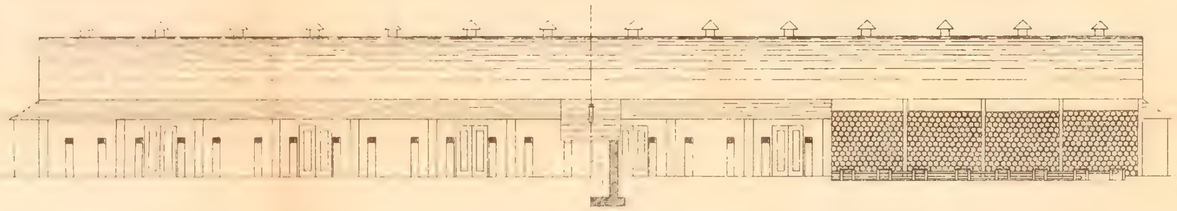
STANDARD UNIT 126'-0" × 36'-0"



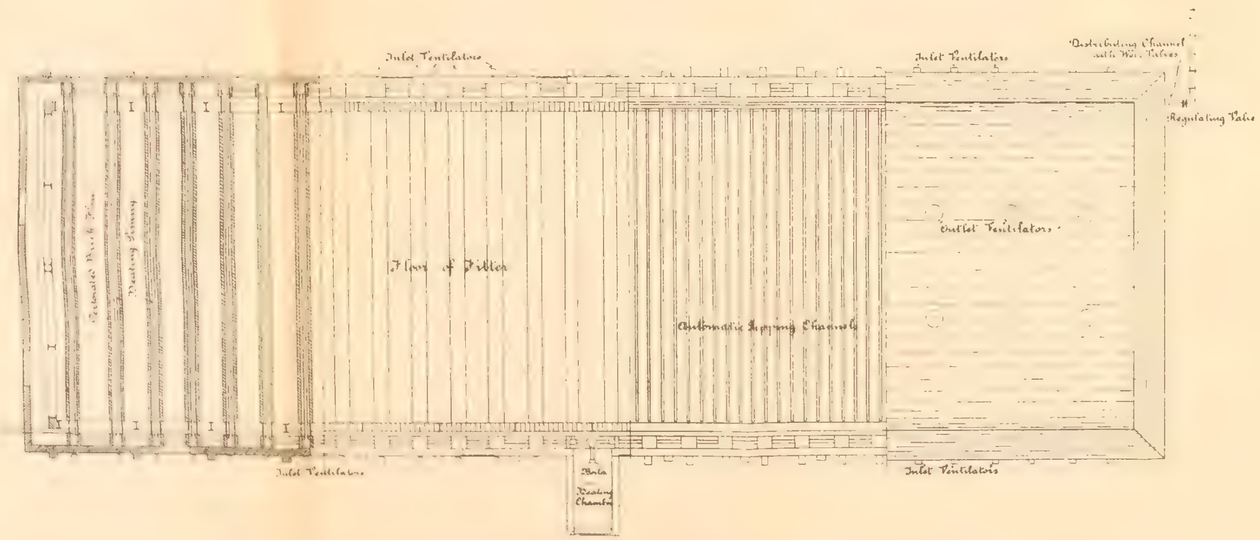
SECTION OF FILTER


Aerating Pipes
½ to ¾ Fritrified Clinker
Aerating layer & 1" Pebbles & Pipes
¾ to ¾ Fritrified Clinker
½ to ¾ do do
Aerating layer
½ to ¾ Fritrified Clinker
Aerating layer
½ to ¾ Fritrified Clinker
Drainage layer pipes & 1" pebbles

SECTION SHEWING FILTERING MATERIAL



LONGITUDINAL ELEVATION & SECTION



SECTIONAL PLAN

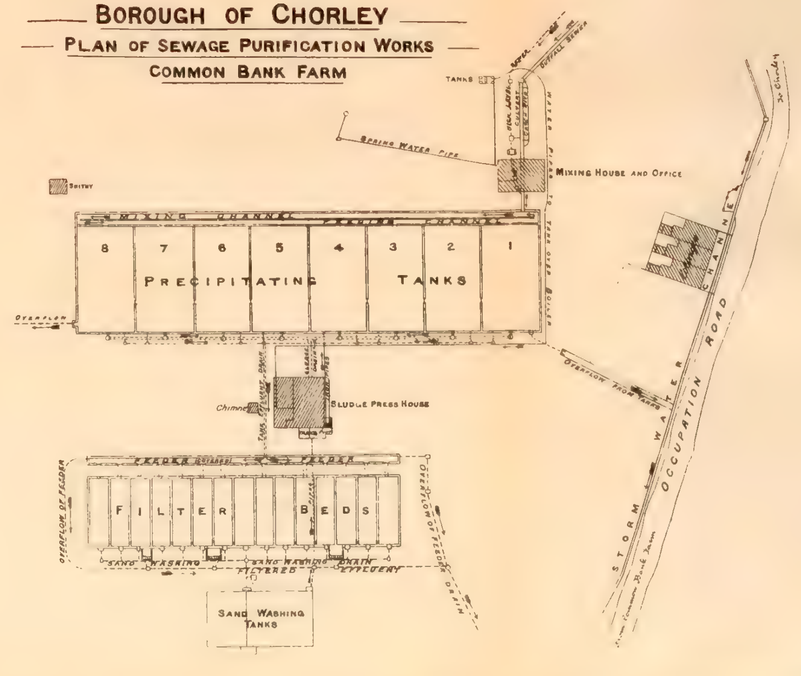
SCALE ⅛ INCH = 1 FOOT

BALTIMORE SEWAGE
1899
DRAWING No 3

BOROUGH OF CHORLEY

PLAN OF SEWAGE PURIFICATION WORKS

COMMON BANK FARM



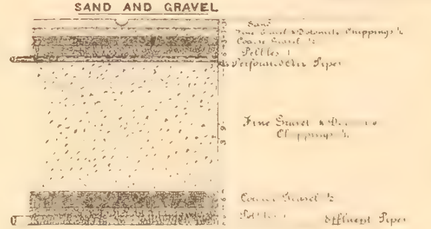
SCALE. 60 FEET TO AN INCH

LOWCOCKS AERATED BACTERIAL FILTER

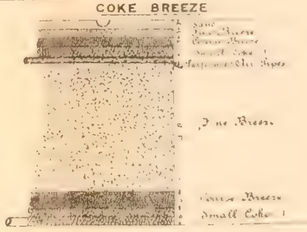
WOLVERHAMPTON

SECTIONS OF FILTERS

SAND AND GRAVEL

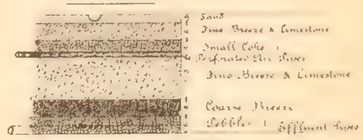


COKE BREEZE



TIPTON

COKE BREEZE



Sir Rawlinson's
Westminster
1 January 1899

From this channel 15 branch pipes conduct the tank effluent to the 15 filters, and the discharge is regulated by an upward moving sluice door actuated by hand.

At each end of the channel there is a square-headed weir penstock working downwards, by means of which the whole or part of the tank effluent may be sent to the river without going through the filters. When these penstocks are in their normal position (that is to say, closed,) the tank effluent in the channel cannot overflow them without first escaping on to the roadway in front of the filters, and thus revealing the fact that the tank effluent is not passing through the filters.

The inlets to the filters are at one of the narrow ends, and a shallow rectangular iron channel, 12 inches by 3 inches, runs longitudinally along the centre of each at the level of the top of the sand, and into this the tank effluent is discharged when the inlet sluice door is opened, and is distributed over the surface of the filter.

At the outlet end of this channel there is another sluice door which is kept shut when the filters are at work, but which is opened when the surface of the sand is being washed.

The filtering material consists of 18 inches of clean washed gravel at the bottom, ranging from an inch-and-a-half to one-eighth inch in the longest dimensions, laid in layers with the largest stones at the bottom, and gradually decreasing in size until the top layer, which is fine pea-gravel. Then follows twelve inches of polarite and sand mixed in equal proportions, and on this there is nine inches of ordinary washed filter sand. The total depth is thus 3 feet 3 inches.

There are eight 3-inch perforated horse-shoe tile under-drains laid longitudinally on the bottom of the filter in the gravel. Two of them are against the division walls at each side, and the other six are laid equidistant from each other and parallel to the division walls.

Against the outlet end wall and on the bottom of the filter floor there is a 6-inch drain into which the longitudinal under-drains discharge, which passes through three filters and discharges the filtrate from the three filters into the outlet pipe, which is controlled by a valve.

This triplicate arrangement assists in the washing of the sand surface. When this operation is being performed the three inlet doors are closed and the filtrate is allowed to flow out until the sand surface appears. The outlet valve is then shut and the liquid in the three filters is thus imprisoned. If the surface of No. 1 is to be washed, the inlet doors of No. 2 and No. 3 are opened, and tank effluent is allowed to flow in until there is a head of 4 inches on them. This goes down as usual, but having no outlet it backs up the under drains into No. 1 and rises to the surface of the sand therein. The outlet valve on the shallow channel on the sur-

face of No. 1 is opened, and the surface of the sand is brushed to remove the dirt, and the dirty water escapes by means of the shallow channel to the wash water tank below the filters. The head of tank effluent is kept up in Nos. 2 and 3 until No. 1 is cleaned, then the inlet valves are closed, the top outlet on No. 1 is shut and the bottom outlet valve of the triplicate tanks is opened and the filtrate escapes until the sand is exposed on all the three filters. The bottom outlet valve is again closed, tank effluent is turned on to Nos. 1 and 3, the top outlet door of No 2 is opened, the sand surface of No. 2 is washed, and so on.

In addition to the brushing of the surface by soft brooms a rake is also used, which goes three inches into the sand. By this means the dirt below the surface is washed out. The brushing and raking is done weekly.

It is also found necessary every 4 or 6 weeks to dig and turn over the sand as deep as the polarite layer to clean it thoroughly, and this is done when the filter is resting.

The outlet valve of the filters is always open except when the filters are thrown out of use for washing. When filtering is going on the inlet doors are opened until the tank effluent stands 3 inches above the sand, when they are closed, and the water sinks to or below the sand surface. Tank effluent is again turned in until it stands 3 inches above the sand as before, and the inlet is again closed until it passes down, and so on, time after time. In practice the fillings occur at intervals of half an hour, but 20 minutes suffices.

Filtering goes on from 6 A.M. to 9 P.M. daily. After 9 P.M. the filters drain themselves empty and stand full of air till 6 A.M.

Four sets of three are in daily use at least. The fifth set of three is either being washed or is resting.

One set of three is thrown out of use and washed in daily rotation, and thus in five days the rotation of the five sets is complete. The washing takes the whole time of two men. On the remaining two days of the week the fifth set of filters is either resting or in use, according to the pressure of work.

The sand washing water flows into a wash tank, and is pumped back into precipitation tank No. 4. The total volume pumped back equals 60,000 gallons per day, for five days per week. The water pressed out of the wet sludge flows back into No. 4.

Crude sewage mixed with an extra quantity of precipitant is turned into No. 4 tank, and mixed with the sand washing water and press liquor, and so far as the eye can see, the effluent from it is as good as any which comes from the tanks.

Very great care is exercised to get a good tank effluent, particularly in regard to the absence of suspended matters. This is essential to the free working of the filters, for if the tank effluent is cloudy the filters tend to choke.

The intermittent working of the filters is necessary to successful work, as is also the regular washing and digging of the surface of the sand. If the sand is not kept clean the rate of filtration falls off very rapidly.

The filtrate is bright and sparkling, and all along the channel into which it is discharged there is a dark green vegetable growth, which betokens a fully oxygenated effluent.

I had special analyses of the crude sewage, tank effluent and filtrate made for this report by Mr. Frank Scudder, F.I.C., F.C.S., acting for Sir Henry Roscoe, with the following results:

SAMPLES COLLECTED 12TH DECEMBER, 1898.

Chemical results expressed in grains per gallon.

	Crude sewage. 9.00 a. m. to 12.35 p. m.	Tank effluent. 3.00 p. m. to 5.30 p. m.	Filtrate. 3.20 p. m. to 5.30 p. m.
Solids in Suspension.			
Mineral	27.5	....	....
Volatile	59.0	....	....
Solids in Solution.			
Mineral	43.5	52.0	44.0
Volatile	17 5	10.5	11.0
Chlorine	6.8	6.7	4.7
Oxygen Absorbed.			
3 minutes test	2.36	0.69	0.10
4 hours test	7.89	2.31	0.17
Nitrogen as Nitrites and Nitrates.	....	0.005	0.148
Free and Saline Ammonia.	4.02	2.94	0.07
Albuminoid Ammonia	1.162	0.512	0.032
Transparency (millimetres seen through)	20	140	over 530

Mr. Scudder calls attention to the large decrease of the chlorine in the filtrate as an abnormal circumstance.

At *Huddersfield*, where the sewage is mixed with a large quantity of trade refuse, the polarite filters have not answered, and the filtering material is being replaced by coke breeze. There seems to be no doubt that only a part of the total volume of sewage was ever dealt with by

the filters, and the corporation found themselves unable to filter one-tenth of the daily dry-weather flow.

At *Hendon*, a suburb of London, where the sewage is principally of a domestic character, the Council have not been able to do the quantity of work with the polarite filters which they were designed to do.

At *Lincoln* the polarite filters have not answered the expectations under which they were made. Instead of filtering 1,000 gallons per square yard per day, the City Surveyor informs me that he can only get 150 gallons, notwithstanding that he employs 4 men to wash the sand and keep it clean.

For many years *Hyde*, near Lancashire, was a show place for the polarite system, but the effluents have lately been condemned by the Mersey and Irwell Rivers Board.

Ducat's Aerating Bacterial Self-Acting Filter.

The sewage of Hendon is mainly domestic, and is of a foul character, owing to the large number of laundries for London in the district.

The original Ducat filter was made in January, 1897, and was at work in March of the same year.

The new filter was built in the early months of 1898, and started work in April last.

The root idea of the system is to have an intermittent stream of sewage passing through a fully aerated mass of finely broken material which harbours microbes capable of breaking down the organic matters and converting them into harmless forms.

Neither of the Hendon filters combines all the developments of the standard filter, but the various parts are successfully at work in one or the other.

Before describing the Hendon plant, it will make things clearer if the perfected filter is first dealt with.

Colonel Ducat proposes to use standard units with a filtering area of 126 feet x 36 feet, or 504 square yards, capable of dealing with a dry weather flow of 100,000 gallons per day. If the dry weather flow be 1,000,000 gallons per day, 10 of these filters would be used, and as each is complete in itself the larger flow would be dealt with by the multiplication of the individual units. There is only one very slight qualification of this, viz: that the warming apparatus can conveniently serve two filters, and would, therefore, in practice be placed between each pair, but each unit can have a separate warming apparatus, and be completely independent, if that is deemed best.

The floor of the filter is made of concrete or other impervious material, and has a slope of 3 inches from the centre towards the long sides and a hip slope of 3 inches towards the ends.

On the bottom there are 28 transverse perforated brick air flues 4 feet 6 inches from centre to centre, measuring about 9 inches x 9 inches in cross section in which the hot water pipes are laid.

The sides of the filter are made as open as is possible, and may conveniently consist of panels of open drain-pipes between brick piers, or vertical iron standards. These panels are 8 feet wide and extend from the floor to the top of the filtering material. On the bottom there are two rows of bricks, with every alternate brick omitted, and the remainder of the panel is made of butt-ended drain-pipes 12 inches long and 4 inches in diameter, laid one on the other as close as possible, and held in place by the cement mortar which fills the spaces outside the pipes. They have a slope of 1 inch upwards from the inside. The panel is thus a perforated wall in which the holes are very much in excess of the solid parts. It has little strength for resisting pressure, but the load is really carried by the standards, or by the heavy brick piers.

The filter has 14 of these panels on each of the long sides and 4 on each of the short ones.

The space so enclosed is filled in the following manner: There are first laid on the floor transverse lines of 3-inch butt-jointed drain-pipes from every space left alternately in the bottom rows of bricks. They are not closely joined at the ends, and thus space is given by which air can escape into the filtering medium.

The space between them is carefully packed with clean furnace clinker of the size of walnuts which has been held back by an inch screen, and the layer is continued above them until its total depth is 6 inches. On this an 18-inch layer of clean furnace clinker is laid, which has passed a quarter-inch screen and been held by an eighth of an inch screen. These two layers have a total depth of 2 feet and form the bottom section of the filter.

On the top of this section transverse lines of 3-inch drain-pipes are laid from the pipes in the panels to the interior in exactly the same way as on the floor, and a 6-inch layer of coarse clinker and an 18 inch layer of fine clinker is put on exactly as in the bottom section, thus completing the second section.

The third section has the aerating pipes and the 6-inch layer of coarse clinker as in the second, but upon the 6-inch layer there is 12 inches of ⅛-inch to ¼-inch vitrified clinker, and then a 6-inch layer of ¼-inch to ½-inch of vitrified clinker, the three layers forming a third section 2 feet deep,

On it there are laid aerating pipes and a 6-inch layer of coarse clinker as before, and then an 18 inch layer of ¼-inch to ½-inch vitrified clinker, the two layers forming a fourth section 2 feet deep.

In the normal filter there are these four sections with a total depth of 8 feet, but five sections or six sections, or any number, may be used if a very high degree of purification is to be attained, and the extra ones are put in the same as No. 2 and between No. 2 and No. 3.

The filter is by this construction porous from top to bottom, and air is admitted to the filtering material all the way round by the panels, and is carried right into the interior by the transverse lines of pipes in the coarse or aerating layers.

The carrier for distributing the crude sewage is built on one of the long walls, and from it at 18-inch centres there are small outlet pipes discharging into the tipping channels, which are made of iron, light in section, and are fixed transversely about 6 inches above the filtering material. Each channel is 36 feet long and has one vertical side 2 inches high, a short flat bottom one inch wide and a sloping side rising to the same height as the vertical side. They are carefully pivoted at intervals and balanced, so that when they are empty the top is horizontal, but when the sewage rises in them the centre of gravity is shifted towards the sloping side, and the channel tips over and distributes its contents on to the topmost layer of the filtering material. There are 84 of these channels to each standard filter, and as they hold about 4½ gallons of sewage each, it follows that each one must tip every 5 to 5½ minutes on the average when the filter is dealing with 100,000 gallons per day.

On the outside of the panel walls on the four sides of the filter there is an open drain below the level of the floor into which the filtrate escapes at every opening, and by which it is conveyed to the outfall stream or river.

The filter is covered by a roof which rises at the centre 7 feet 6 inches above the walls, and it is enclosed by a brick wall all round, about 18 inches from the panelled walls, and the space between them is roofed in by a small lean to roof. Thus the filter itself is enclosed and covered in all round.

There are seven doors in each of the long outer walls and two in each of the end ones, for access to this narrow passage, and to admit air to the filter in summer time when artificial heating is not necessary.

There are 28 vertical inlet air-pipes on each of the long outer walls, by means of which air is admitted inside the outer wall and into the

perforated brick air flues, and there are 28 ventilators in the roof for the escape of the air.

The heating chamber measures 12 feet x 6 feet, and contains a small closed boiler stove. The hot water pipes are laid from it in a sunken channel between the filter and one of the outer longitudinal walls, with a return branch through each pair of perforated brick flues.

Colonel Ducat's experience is that microbial action ceases when the temperature on the filter falls below 37° F., and that nitrification is suspended when it rises above 120° F. The latter contingency is remote in England, but the former one is provided against by the heating apparatus which is used only in the cold season.

This standard filter has not yet been built or used as a whole, but it consists of a repetition of complete parts which have all been tried individually at Hendon.

The filter has its floor on the ground level, and looks like a low, windowless store.

The working of the filters is very simple after they have been inoculated and got into condition.

This is done by running the crude sewage on to them by means of the tipping channels for one hour and then shutting it off for an hour and repeating this 5 times a day for 14 days. During the next fortnight the dose is made continuous for 10 hours daily. In the third fortnight the filter is put to its full work day and night and receives its 100,000 gallons per day intermittently by means of the tipping channels in the normal manner.

The microbes which do the work are self-sown in the filtering material from the sewage itself. During the first part of the first fortnight the effluent from the filter is cloudy and has a distinct odour; the microbes, however, multiply and do better work as the days pass, and before the end of the fortnight the effluent is clear and odourless. When the dose is doubled in the second fortnight, the quality again falls off at the outset and gradually improves towards the end. When the sewage is first applied in its full quantity over the whole day and night there is a further falling off in quality, but by the end of the fortnight the filter is getting into condition. The effluent is then clear, and it gradually improves until at the end of three months from the first dose of sewage the filter is completely inoculated and is in prime condition. The sewage at the outset takes about 80 minutes to pass through the filter, but when in full working order and the filtering medium is coated with bacterial film 100 minutes are taken.

After a filter is once in working order it is claimed that it can be left unused for months and will then resume its normal activity and efficiency in a day or two.

The filters at Hendon are fed with crude sewage from the bottom of the high level carrier which conveys the sewage to the precipitation tanks. The inlet to each pipe is protected by a screen of about ½-inch mesh which keeps back floating and large solids, but otherwise the sewage is crude. During rain the extra height of the sewage in the main carrier puts additional head on the pipe and thus causes a larger delivery to the filters than the 100,000 gallons per day. The variation of the dry weather flow likewise influences the head, and by that means the quantity delivered to the filter varies somewhat with the flow.

The original filter measures 15 feet x 12 feet on the surface of the filtering material, and has an area of 20 square yards and a depth of 8 feet. It has dealt with 4,000 gallons per day for seven or eight months continuously with satisfactory results.

The newer filter was started in April last and measures 15 feet x 12 feet=20 square yards—and has a depth of 10 feet. It has dealt with 4,000 gallons per day and its share of storm water, for about seven months almost continuously, allowing for occasional experiments and small structural alterations.

The sewage going to the filter on the 13th December last was thick, foul stuff, but the effluent appeared all that could be desired.

In the fil er under the roof there was a distinct smell of sewage, but at no other part.

The surface of the filtering material is not choked and has no scum on it and does not need raking over more than once in three months.

This filter is heated and had the tipping channels working.

It is connected to the main sewer by a 1½-inch pipe, which is about 9 feet long.

The analytical results of the process at Hendon on 6th October last are given by Mr. A. C. Houston, M. B., D. Sc., as follows:

Results stated in parts per 100,000.

	Crude sewage.	Filtrate.
Oxygen absorbed in 4 hours	14.72	0.78
Free Ammonia	8.70	0.30
Albuminoid Ammonia	1.60	0.094
Oxidized Nitrogen	....	0.477
General characteristics	A foul sewage emitting a most offensive smell.	As transparent and free from odour as an ordinary drinking water.

Part II.

It will be seen from my description of what has been done as to the bacterial treatment of sewage in England, that up to the present time the trials have been on a somewhat small scale.

The complete Dibdin process at Sutton has dealt with 120,000 gallons per day out of a total flow of 400,000 gallons, the septic tank process at Exeter with a dry weather flow of 31,380 gallons per day, the Lowcock system with 7,680 gallons per day at Tipton, and the Ducat system with 4 000 gallons per day at Hendon.

Although these are meagre in quantity yet the results obtained warrant a hopeful view of the future usefulness of the processes, and I think the bacterial methods have established themselves in this country as very valuable means of treating sewage.

It is more than probable that experience will modify many of the views now held about them, and will also alter the methods of their application which now obtain.

But on the other hand certain definite results appear to be determined, and some of the limitations are revealing themselves.

In the Dibdin process for dealing with crude sewage it is evident that a large proportion of the matters which form sludge in chemical processes are converted into soluble forms by the bacteria, and that there is no solid residue produced.

This is a long step in advance, and will considerably reduce the working expenses of sewage treatment.

I advisedly, however, limit the results obtained in this direction to "a large proportion" because it is by no means proved that all the solids are disposed of. On the contrary there is evidence that some proportion remain in the filter and reduce its water content.

It has been found that a filter may have a water capacity of 50 per cent. of the bulk of the filtering material when first used, and that the water content diminishes rapidly by use in 8 weeks to 33 per cent., and then remains about that percentage when its output is a given volume per day. The deterioration of the water content is partly ascribed to the growth of bacterial substances on the surfaces of the filtering material and it is no doubt also partly due to the accretion of the mineral matters contained in the sewage remaining in the filter and which the bacteria are probably unable to liquefy.

When a Dibdin filter is given a long period of rest a recuperative process occurs which enlarges the water content, but in no case does the water content appear to return to its original percentage.

At Sutton, after two years of hard work, the water content of the coarse filters has deteriorated to 19 per cent. There is reason to think that this is exceptionally low, but even if it should prove to be the case generally with the Dibdin filters, the difficulty is not a serious one. It would not be an expensive nor a difficult matter to have spare filtering material at hand to take the place of the choked material, and the operation of emptying and refilling a filter would not be a long one. There is a consensus of experience that choked material recovers by exposure to air without nuisance, and is serviceable again in six or eight weeks.

One of the drawbacks of the Dibdin filters when the outlet valve is first opened, is the opalescence of the filtrate. This is caused partly by the fact that the sewage in the underdrains has not been so long in close contact with the filtering material as that held in the body of the filter, and the bacteria, therefore, have not been so effective in their action upon it; and partly to the fact that when the valve is opened the full head of the filtrate causes a rush which carries with it some of the matters adhering to the filtering particles. After a few minutes the filtrate comes away clear and bright, and improves in appearanee till the end of the flow.

These causes can be removed to a large extent. If the bottom layer in the filter was of coarse material, and a large number of outlets were provided in one of the long sides of the filter, it ought to be possible to do without underdrains, for by the arrangement suggested there would be a much greater outlet provision than has yet obtained in practice, and the filtrate would not have such long distances to travel to them. Under such conditions it will probably occur that the waterway provided by the spaces between the coarse pieces will be sufficient to discharge the filtrate as rapidly as is desirable. If the valves controlling these outlets were actuated from a common shaft, there could be no difficulty in regulating the flow so as to make the quantity discharged per minute a fairly even one throughout, and of fixing it at such a speed that it would not wash out particles adhering to the material.

The Dibdin filters have a certain rigidity of operation which is a disadvantage in times of rain when the volume to be coped with is increased many times above the average. The cycle of work consists of four parts: First, the filling; second, the standing full; third, the emptying, and fourth, the aerating. It cannot matter as to the length of time taken for filling, and this may be expedited to any practical degree without disturbing the bacterial processes. The periods of standing full, discharging and aerating cannot, however, be much curtailed

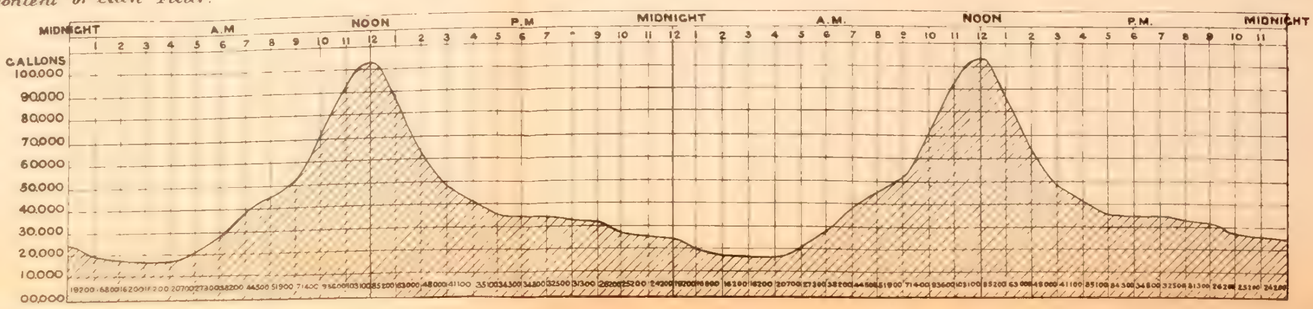
BACTERIAL TREATMENT OF SEWAGE

ROTATION OF FILTERS

BALTIMORE SEWAGE
1899
DRAWING No. 4

NOTE

The Diagrams show the Rotation of the Filters for 48 hours when dealing with a daily dry weather flow of 1,000,000 gallons or 160,000 cubic feet. The solid cubic content of the Filters to the top of the filtering material is 12,000 cubic yards = 324,000 cubic feet and the interstitial space occupied by the sewage is taken to be 106,667 cubic feet or 32·922 per cent of the solid content. The water content is thus exactly two thirds of the daily flow. The effect of dividing the Filters into 4. 6. 8. 10 and 12 equal parts is shown by the diagrams. The depths of the black portions are in proportion to the cubic content of each Filter.



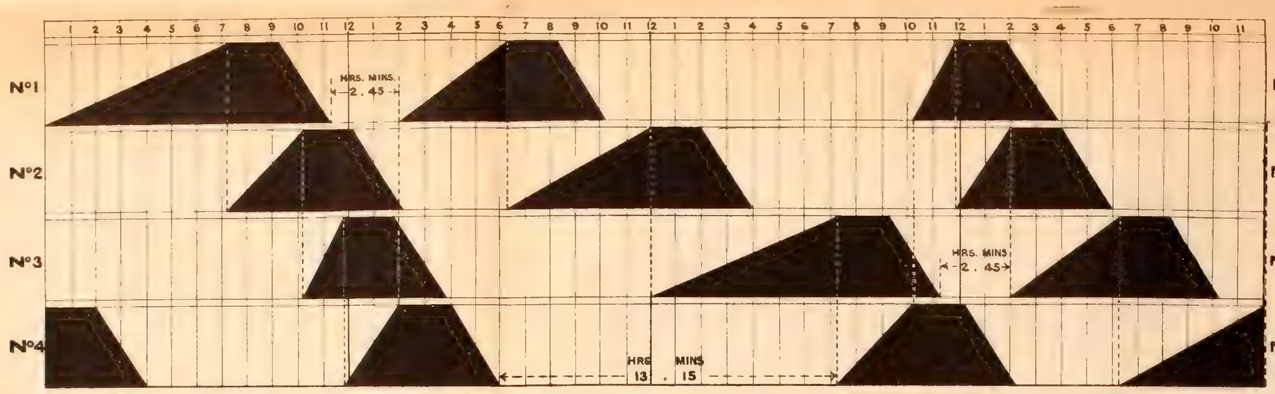
CURVE showing the normal variations in the daily flow of the dry weather sewage.

FOUR TANKS

Water content of each = 26,666·66 cube feet
4
106,667 cube feet

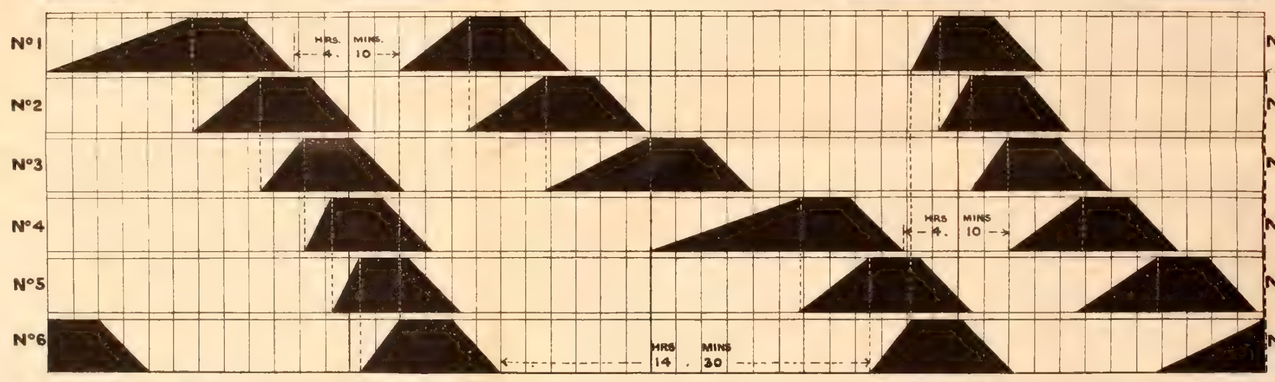
Explanation.

The Black in the Diagram represents the times when the filters are charged with sewage:- thus in No1 the sewage is turned in at midnight and gradually rises until at 7 15 a.m. the filter is full. It remains at rest for two hours and is then discharged in the next two hours. This is shown graphically by the shape of the black portion



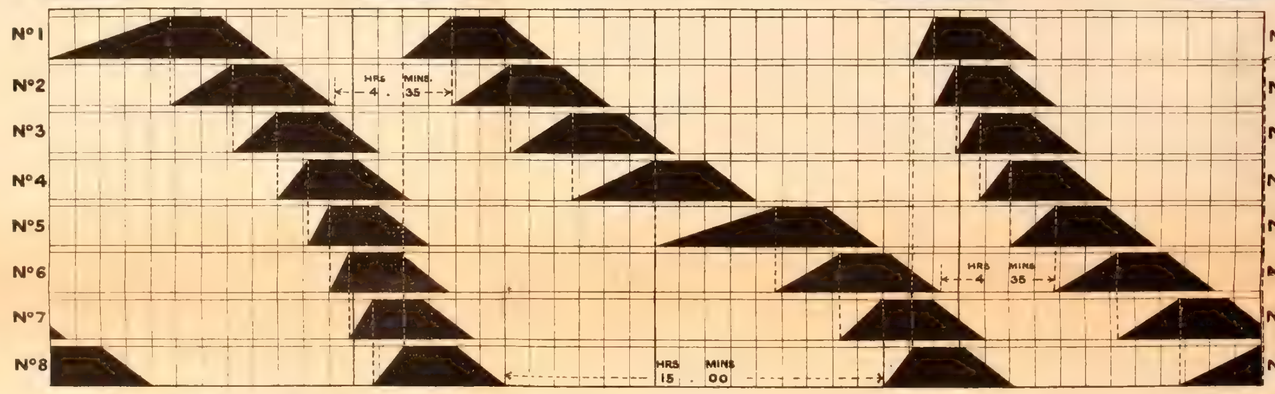
SIX TANKS

Water content of each = 17,777·77 cube feet
6
106,667 cube feet



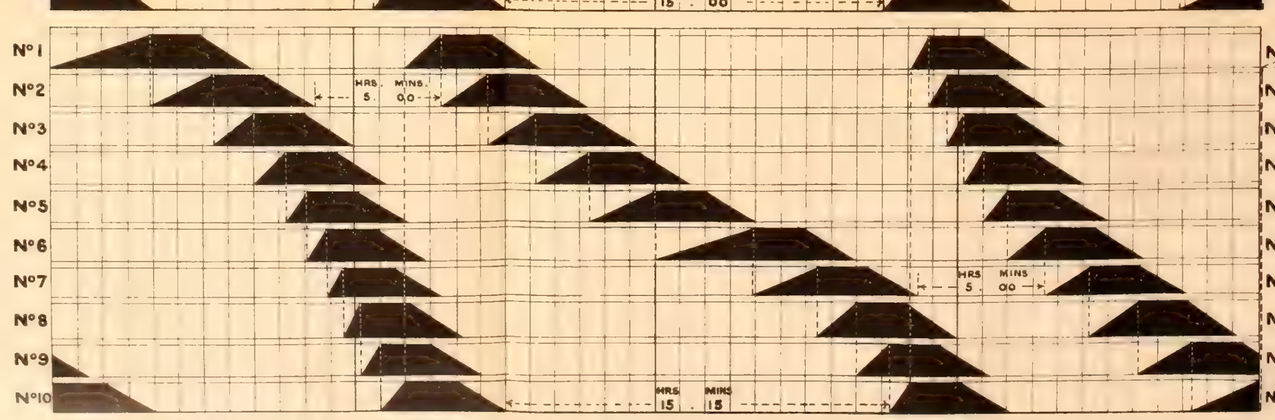
EIGHT TANKS

Water content of each = 13,333·33 cube feet
8
106,667 cube feet



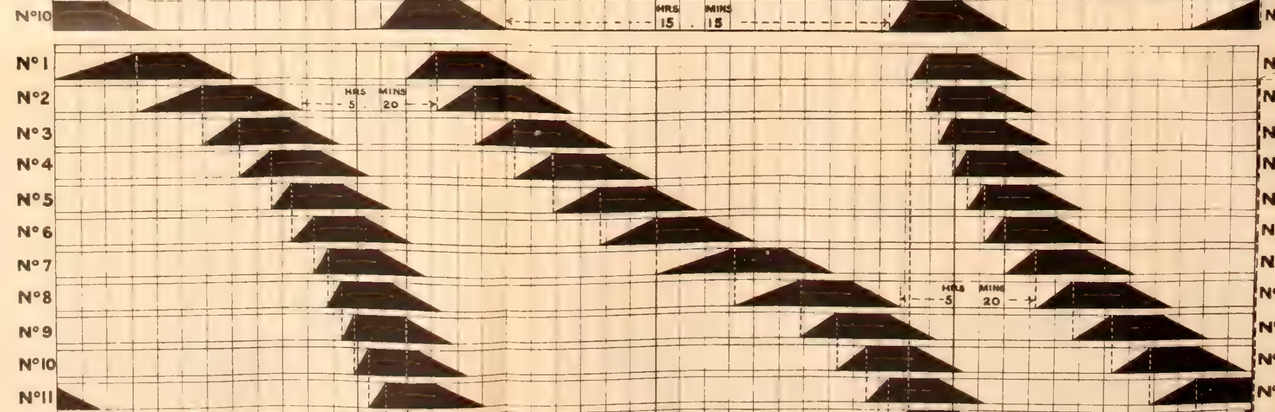
TEN TANKS

Water content of each = 10,666·66 cube feet
10
106,667 cube feet



TWELVE TANKS

Water content of each = 8,888·88 cube feet
12
106,667 cube feet



SEWERAGE COMMISSION | MENDES COHEN. E.H. HAMBLETON. E.C. BARTLETT

Plate XII

Jas Hemingway C.E.
Westminster
11th January 1899

without deranging the system, and this is a real difficulty which has not been fully met.

Closely connected with this question is that of the number of divisions into which a given content of filtering material may be most usefully divided, and as the practice here has not proceeded on any defined lines, I have gone into the matter and the results are shown on Drawing No. 4*.

I have taken the dry weather flow to be 1,000,000 gallons per day or 160,000 cubic feet.

The filter content for that quantity should be 12,000 cubic yards or 324,000 cubic feet. The water content may be taken at one-third, but for convenience of calculation it is put at 32.922 per cent., or 106,667 cubic feet, which is exactly two-thirds of the daily volume of 160,000 cubic feet. In this way each filter is charged three times in two days, or an average of one and a half times per day.

In dry weather the sewage does not reach the works in an even stream, but varies each hour. The flow is smallest at night and greatest near mid-day, and the extreme variation between the minimum and the maximum flow in the case of a town within say two miles of the disposal works is as much as six times. The curve of the hourly variations shown on the Drawing is a typical one in this country. The diagrams show the effect of dividing the filter content into 4, 6, 8, 10 and 12 equal parts. Starting to fill No. 1 at midnight, in the case where the filter content is divided into four, it will be found that the night flow does not charge it until 7.10 A.M., when the sewage is diverted into No. 2 and the increased flow fills it by 10.10 A.M., No. 3 is then used and is full by 11.50 A.M., and then No. 4 is brought into action and is charged by 2 P.M. Returning to No. 1, which was full at 7.10 A.M., it will be found by allowing it to stand full two hours and to empty in two hours, that it was cleared by 11.15 A.M. No. 4, however, was not full until 2 P.M., so that No. 1 had two hours 45 minutes for aeration before the sewage must be turned into it again. An examination of the diagram will show that this is the busiest part of the day's work, and that the other tanks have much longer periods for aerating; as for instance No. 4, which has 13 hours 10 minutes.

By dividing the filter content into six equal parts and again starting at midnight, it will be seen that No. 1 is filled by 5.50 A.M., and by giving it two hours to stand charged and two hours for discharge, it is empty by 9.50 A.M. As the content of the six is the same as the four just dealt with, the last filter is full in each case at the same hour, viz: 2 P.M., when No. 1 is brought into use again. It was empty, however, at

*Plate XII.

10 50 A.M., and has thus been aerating for 4 hours 10 minutes. The effect of the smaller subdivision is to increase the time of aerating from 2 hours 45 minutes to 4 hours 10 minutes at the busiest time. The gain is entirely due to the shorter period taken to fill the smaller filter. Similiarly the maximum aerating period is extended from 13 hours 10 minutes to 14 hours 40 minutes, and at every intermediate step the aerating period is increased.

With 8 subdivisions the least aerating period is extended to 4 hours 35 minutes, and the greatest to 15 hours.

With 10 subdivisions the shortest aerating time is 5 hours, and the longest 15 hours 15 minutes.

With 12 subdivisions the aerating periods are extended to 5 hours 20 minutes as a minimum, and to 15 hours 20 minutes as a maximum.

I think it will be found in practice that 8 subdivisions are the most useful, because what little is gained by further subdivision is scarcely worth the extra cost of construction and operating.

With 8 equal parts it is possible to get through the day's work by using 7 only, but the minimum aerating period is then reduced to 2 hours 50 minutes. It may prove a convenience in practice to be able to use this possibility of throwing one filter out for a few days without unduly working the remainder.

There has likewise been confusion in the practice as to the *quantity* which can be dealt with by a given filter content. It was at first assumed that 160,000 cubic feet of sewage could be dealt with daily by 160,000 cubic feet of filtering material. This is true in one set of conditions and not in another.

On Drawing No. 5* I have set out a series of filters of the same content as before , namely, 324,000 cube feet divided into 8 equal parts, and I have shown the rotation when they deal with the dry weather flow of 1,000,000 gallons=160,000 cube feet per day, and also when dealing with a regular and even flow of 2,000,000 gallons or 320,000 cube feet per day, and with 3, 4, and 5 million gallons per day.

The curve of the daily flow is the same as in Drawing No. 4, and so is the diagram of the fillings for the dry weather quantity. The point to be observed is that the long times occupied in filling the filters make the output of 324,000 cubic feet of filtering material under the conditions I have assumed only 160,000 cube feet of sewage per day.

When, however, the variations in the flow are straightened out during rain and an even and regular quantity of 2,000,000 gallons or 320,000 cube feet per day is sent to the filters, the periods of filling are all of

*Plate XIII.

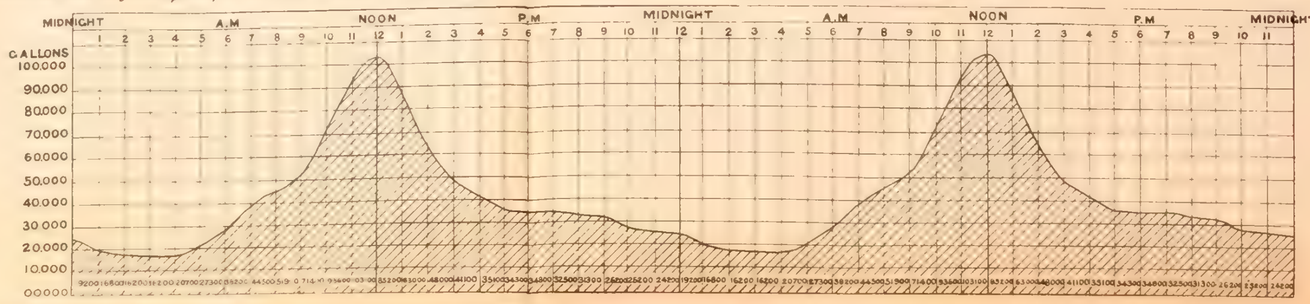
SEWERAGE COMMISSION | MENDES COHEN, ELI HAMBLETON, E.L. BARTLETT

BACTERIAL TREATMENT OF SEWAGE
ROTATION OF FILTERS

BALTIMORE SEWAGE
1899
DRAWING No 5

NOTE

The Diagrams show the Rotation of the Filters for 48 hours when dealing first with a dry weather flow of 1,000,000 gallons per day or 160,000 cubic feet, and then with the addition of rain water to make the flow an even one of 2, 3, 4 and 5 million gallons per day.
The solid cubic content of the Filters to the top of the filtering material is 12,000 cubic yards = 324,000 cubic feet and the interstitial space occupied by the sewage is taken to be 106,667 cubic feet or 32·922 per cent of the solid content. The water content is thus exactly two thirds of the dry weather flow.
The Filters are divided into eight equal parts each with a water content of 13,333·33 cubic feet which equals 106,667 cubic feet in all.

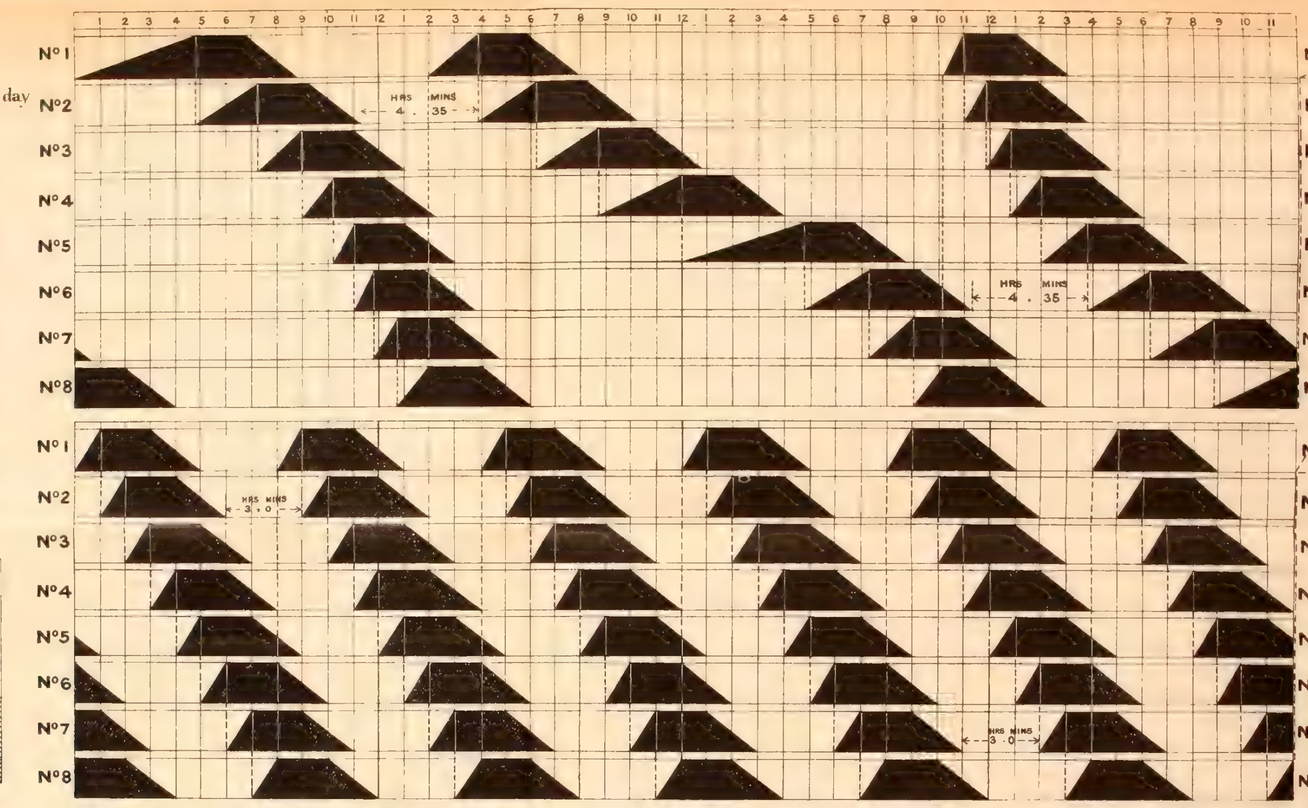


CURVE showing the normal variations in the daily flow of the dry weather sewage of 1,000,000 gallons per day

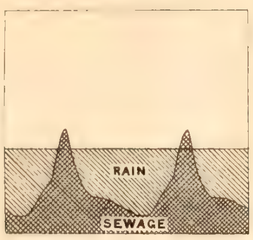
Dry Weather Flow
1,000,000 gallons per day

Explanation.

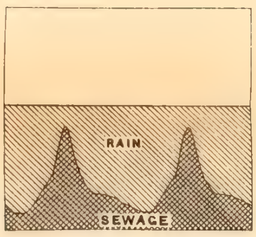
The black in the Diagram represents the times when the filters are charged with sewage :- thus in No 1 the sewage is turned in at midnight and gradually rises until at 4.50 a.m the filter is full. It remains at rest for two hours and is then discharged in the next two hours. This is shown graphically by the shape of the black portion.

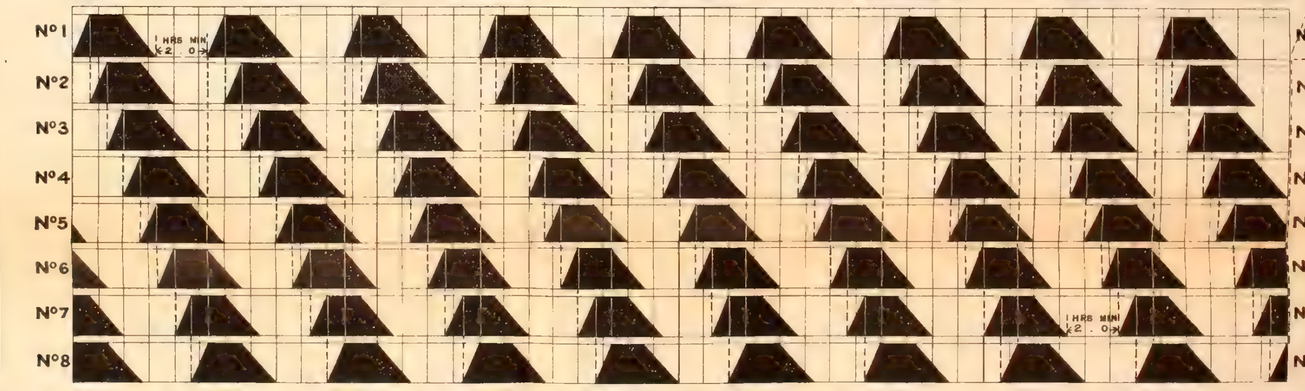


Regular flow of Sewage and Rain.
2,000,000 gallons per day

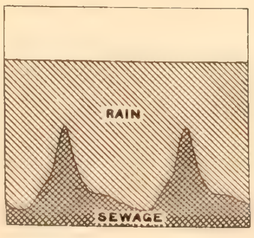


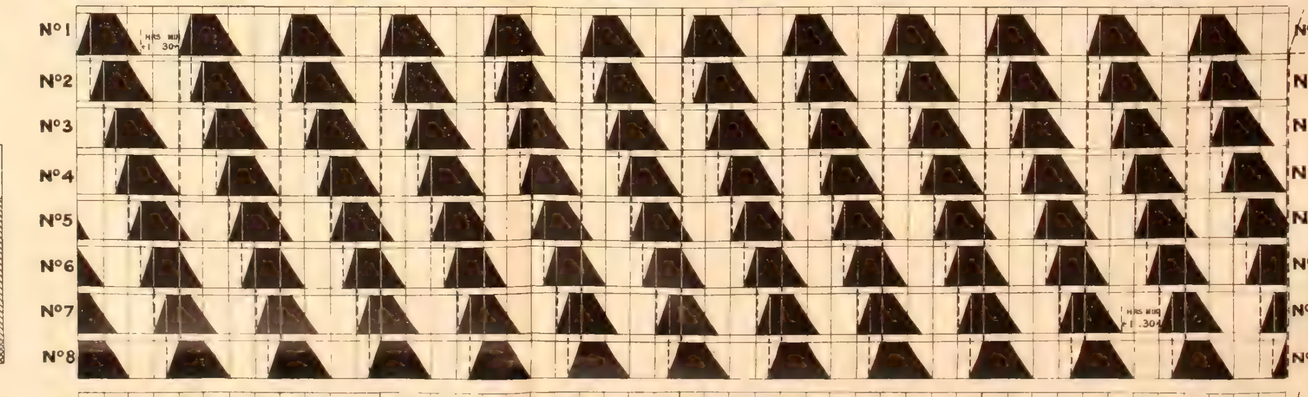
Regular flow of Sewage and Rain.
3,000,000 gallons per day.



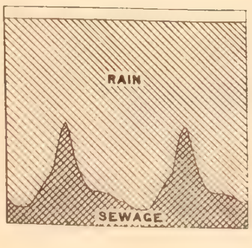


Regular Flow of Sewage and Rain.
4,000,000 gallons per day.





Regular Flow of Sewage and Rain.
5,000,000 gallons per day



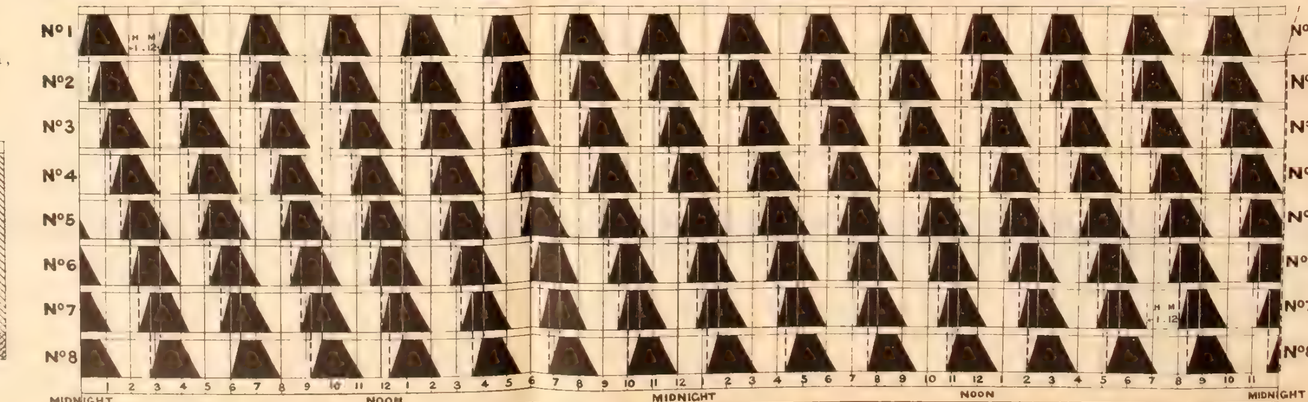


Plate XIII

J. W. Mansfield C.E.
Westminster
11 January 1899

equal length, viz: one hour; and by giving 2 hours or standing full and 2 hours for discharging as before, 3 hours are obtained for aerating, making the cycle an 8 hours one. In this way each filter is used 3 times a day, and the output of the 8 is doubled, as compared with the dry weather flow. In this case 324,000 cube feet of filtering material deals with 320,000 cube feet of sewage.

When the flow is a regular one of 3,000,000 gallons per day the aerating period is reduced to 2 hours; when the flow is 4,000,000 gallons the aerating time is 1 hour 30 minutes, and when it is 5,000,000 gallons there is only 1 hour 12 minutes for that purpose.

I think it may prove possible to rotate the tanks up to three times the dry weather flow during rain, for the sewage is then diluted with twice its volume of water, and it is reasonable to think that 2 hours for aerating may recuperate the bacteria. Dealing with larger quantities intermittently, however, appears to be impracticable.

It is easy to see in the light of this drawing how the mistake occurred as to the output of the filters. The quantities dealt with in actual practice have been small fractional parts of the daily total, and the hourly variations have not affected the flow to the experimental filters. The quantity was thus an even and regular one, and I have just shewn that in those circumstances the output of the filter is twice as much as in the case when the dry-weather flow with its variations necessarily prolongs the times of filling and aerating.

Mr. Dibdin has within the last few weeks tried the effect of "streaming" the sewage when largely diluted with rain—that is, running it continuously through the filters—and the evidence is that bacterial activity is operative but considerably reduced.

It may be that the rain-water difficulty will be resolved by experiment and investigation, but at present it seems advisable to provide some auxiliary means of dealing with the excess above three times the dry-weather flow. This can be done by constructing a large rain-water filter of coarse material in which the excess may be separately dealt with.

I have found it difficult to appreciate the exact action of the bacteria in a Dibdin filter. The process is stated to be aerobic, but an examination of Drawing No. 5* will show that tank No. 1 is charged at the bottom for 8¾ hours, and it is certain that anaerobic changes are then brought into operation at the later part of that time. Dr. Sims Woodhead inclines to the view that the inferior appearance of the filtrate when first liberated is partly due to this dual action, for he is of opinion

* Plate XIII.

that when the two classes of bacteria act side by side the best efficiency of each is impaired.

The effect of cold is to reduce the efficiency of the Dibdin filters a little. The sewage, in its passage through underground sewers is not brought into contact with the cold, and the few seconds it is exposed to the air in its passage from the sewer into the filter does not appreciably reduce its temperature. When in the filter there is a distinct rise in its heat, and the filtrate is certainly not colder than the sewage when it entered the filter. Similarly, the passage from the coarse filter to the fine one is so short that the cold does not do mischief.

There is some evidence to show that certain kinds of trade refuse, when mixed with sewage, are amenable to the Dibdin process. Tan refuse, vegetable dyes, brewery waste and the like are not detrimental, but it is very doubtful if strong mineral acids can be dealt with bacterially.

In the case of a sewage with a considerable admixture of trade refuse I would certainly experiment with it on a small scale before constructing a plant for the full quantity.

I have recently secured the approval of the Local Government Board to a scheme I designed for dealing with the sewage of a small seaside watering place on the Dibdin system, where the filtrate will be discharged into a tidal river. In that case, however, I can see my way to practically keep the whole of the rain-water out of the sewers.

It is too soon to express a final or very positive opinion on this system, but you will have gathered that I look upon it with considerable approval.

Septic Tank.

Coming now to the septic tank system we have an entirely different set of conditions from those operating in the Dibdin filters. This process seeks to employ the anaerobic bacteria in the septic tank and the aerobic ones in the filters, which are admittedly Dibdin filters.

The Exeter experiment, though on a small scale, deals with the varying dry-weather flow of a distinct district and with the rainfall up to 4 volumes. The water content of the tank at the outset was equal to 40 hours average dry-weather discharge. The flow of sewage into it is very variable as will be seen from the diagram on Drawing No. 2,* where it is shewn that the minimum flow at night is about one-sixteenth of the minimum at 11 A.M., while during rain the disparity is even more accentuated.

* Plate X.

The solid matter of the sewage in its passage through the tank is either liquefied by the bacteria or remains behind as deposit. The change is undoubtedly putrefactive and the tank filtrate has an odour of decomposing sewage. This condition, however, is according to the bacteriologists a favorable one. The exposure to the air, which the tank effluent gets on its way to the filters is sufficient to supply it with the oxygen it needs, and it is then particularly suited to the aerobic action of the filter.

At Exeter there is a marked accumulation of solid matter in the septic tank, which the process seems unable to cope with. The deposit in twelve months equals one-sixth of the total content of the tank, and if it continues at that rate the tank will have to be cleaned out or the time of the passage of the sewage through it will be seriously reduced. Mr. Cameron is testing this phase of the process to destruction at Exeter. In 27 months the content of the tank has been reduced two-fifths, so that the water capacity is now 32,280 gallons, or practically a day's dry-weather flow, which means that the sewage is 24 hours in the tank on the average.

Of course the deposit may be cleaned out from time to time, but in that case the bacterial cultivations will be interfered with, and the sludge will have to be dealt with by some auxiliary means.

As shewing the obscurity of knowledge of the processes at work the different results as to deposit at Exeter and Yeovil are very curious.

At Exeter with domestic sewage the quantity of deposit is substantial, while at Yeovil with a mixture of domestic sewage and trade refuse the deposit is practically nil.

Various guesses as to the cause of this disparity have been made. It has been suggested that the trade refuse at Yeovil may favour the cultivation of bacteria capable of liquefying all the solids, but no proof of this is forthcoming.

It is also regarded as possible that the wider variations of flow at Exeter as compared with the more even flow through the septic tank at Yeovil account for the deposit in the former case. The idea underlying this explanation is that with an even flow an equilibrium is set up between the bacteria and the amount of work they have to do, which is disturbed when the variations of flow upset the balance. In the latter event it is suggested that when the maximum flow occurs the work to be done is in excess of the powers of the liquefying organisms, and that the more resistant parts of the solids accumulate as deposit

Whatever the explanation may be, the fact itself prevents one predicating the results of dealing with a particular sewage by the septic tank system as regards deposit.

Notwithstanding these difficulties and obscurities, I think the septic tank a useful instrument in sewage treatment.

The Dibdin filters, which are adopted by Mr. Cameron as the finishing part of the process, have already been dealt with.

I must point out that the automatic gear used for operating the filters has certain disadvantages.

By referring to Drawing No. 2* it will be seen that the slow flow in the night takes a little more than 10 hours to charge one of the filters, and that the one previously charged stands full all that time. It is certain that the aerobic action is interfered with by this long imprisonment of the tank effluent in the filter. Whether it is worth while saving the labour necessary for attending to the valves by hand at such a cost is one on which opinions may differ, but so far as I see it would be preferable not to use the present form of automatic gear.

There is one engineering advantage in the septic tank which ought to be mentioned, and that is the fact of the effluent flowing out at the same level as the incoming sewage, and thus the tank itself wastes no fall. In certain cases this may have a determining influence in the selection of the particular form of bacterial treatment for a given district.

With reference to Mr. Lowcock's aerated bacterial filters I need not enlarge on their capabilities. It would seem that the supply of air into the filter enables the bacteria to increase their activity, but the recent practice of resting the filter for 12 hours each day tends to show that natural aeration is necessary to the smooth working of the system. The original idea that the mechanical forcing of air into the filtering material would enable the tank effluent to be applied continuously has been modified by the adoption of the half-day intermittent working, and this result tends to support the Dibdin process of alternate fillings.

Ferozone-Polarite.

The Ferozone-polarite process first deals with the sewage by precipitation in tanks, and then passes the tank effluent through a filter made on waterworks principles but with a layer of polarite interstratified therein. There is something unexplained in the history of this process. At one time Hendon was the show place, then Huddersfield was quoted, Lincoln had its turn, and then Hyde was in favour. When one now goes to these places the process is either not completely followed or does not come up to the expectations held when it was adopted.

At the present time the Chorley works are the best. It is to be borne in mind, however, that the sewage there is very dilute, that a large por-

*Plate X.

tion of the excreta does not enter the sewers, that the quantity of precipitant used is very large, that the tank accommodation is much in excess of the dry-weather flow, and that the filters are kept scrupulously clean.

The practice of using the filters at Chorley is entirely different from that followed at the outset. It was then held that 22 hours continuous work followed by 2 hours aeration for the revivification of the polarite was the right way, whereas now the tank effluent is applied intermittently every 20 or 30 minutes and the filter is given 8 or 9 hours aeration daily.

With a tank effluent like that at Chorley, which is clear and bright, it would be instructive to learn the effect of leaving the polarite out of the filtering material.

The results of the Ferozone-polarite system are so varying that one has a misgiving about it.

Seeing that it involves the whole plant for precipitating and pressing the sludge, and that polarite is an expensive filtering material, it is not too much to say that other processes equally efficient may be used at a less cost.

Ducat's self-acting bacterial filter has been tried on a very small scale and for a short time on a strong sewage which is almost wholly domestic, and one cannot therefore speak confidently as to its general application. The results obtained, however, are astonishingly good, and seem to show that accurate principles of cultivating the bacteria which deal with sewage have been applied. I think there is much promise as to its future, but beyond this I do not now care to express an opinion.

I have avoided the commercial side of these processes, but I may now briefly say that Dibdin's process is not subject to any patent, that Cameron's septic tank process is patented, but there is a question whether the protection applies to any part save the particular form of automatic gear for operating the filter, Lowcock describes his filter as a patent one, the Ferozone-polarite system is proprietary, and the Ducat filter is fully protected.

Part III.

Judging the Baltimore sewage problem from the bacterial standpoint at this distance there are two prominent features which immediately attract attention.

The first is the enormous volume of sewage per head per day which your Commission are compelled to provide for, owing to what I cannot help thinking to be an extravagant user of water, prevailing I know all over the States. This is four times what we have to deal with here, and it means, of course, that the works for similar cases would be four times

larger with you than with us. With Dibdin filters an area of 2½ to 3 acres of coarse and a similar area of fine filter three feet deep would be the installation according to present ideas for a population of 30,000 (dry-weather flow, say 1,000,000 gallons,) in this country, whereas with you the area would range from 10 to 12 acres for each kind of filter. Similarly the septic tanks would be four times larger for equal populations.

This means that the cost of installing large structural works for these new and not fully developed processes is greatly increased in your case, and if failure should result the consequences would be serious.

There is also the consideration that diluted sewage like that of Baltimore may develop characteristics during bacterial treatment which have not appeared here. Presumably the task of cleansing the weak sewage ought to be easier than strong sewage, but this is by no means determined.

The second feature of Baltimore is one wholly in favour of the bacterial processes, and it is the fact that you have the sea or large flowing rivers into which the filtrate would be discharged. Such waters are fully oxygenated, and are therefore specially adapted for the reception of bacterial filtrates.

With a sea outlet or an outfall into a big river near to the sea I think the experience here would justify you in installing the Dibdin or the septic tank process for a small population of 10,000 or 20,000 persons, if an auxiliary means of dealing with the excess rain is provided.

It is a long step from the 120,000 gallons dealt with by the Dibdin system at Sutton, or from the 31,000 gallons dealt with by the septic tank at Exeter, to the 40 million gallons at Baltimore, increasing in the future to a possible 120,000,000 gallons, and one could wish there were a few intermediate examples.

The big problem is, of course, merely the multiplication of the smaller ones, and there ought to be no insuperable difficulty in applying what has been achieved to the larger case, but it would be prudent to proceed tentatively.

It may be that your Commission can devise a scheme for part of the city in such a manner as to test the capabilities of one or other of the processes, and which if the bacterial treatment did not answer, could be utilized for chemical precipitation and coke breeze filters.

I have the honor to be, gentlemen, your obedient servant,

JAS. MANSERGH,

Vice-President of the Institution of Civil Engineers, Member of the Institution of Mechanical Engineers, Fellow of the Geological and Meteorological Societies, Etc., Etc.

BACTERIOLYTIC SEWAGE BEDS.

EXTRACTS FROM THE REPORT OF DR. SIMS WOODHEAD, F.R.S.E. DIRECTOR OF THE RESEARCH LABORATORIES OF THE CONJOINT BOARD OF PHYSICIANS (LONDON) AND SURGEONS (ENGLAND.)

Introduction.

It may be well first of all to indicate the lines on which disintegration of the organic matter of sewage is broken down in nature; then to recapitulate briefly the principles on which the same process is carried on in the various methods of "filtration" or disintegration that I have had the opportunity of examining in the filter or bacteriolytic beds in this country.

In nature, as we know, the process of disintegration and putrefaction goes on slowly but very surely, especially in what is known as "living soil," where probably there is a process brought about by the action of various groups of organisms—anaerobic and aerobic acting symbiotically—going on.

On making a bacteriological examination of soil taken from very near the surface it will be found that the number of anaerobic organisms as compared with the aerobic is comparatively small. As we go deeper down, however, the proportion of anaerobic organisms is much larger, until we come to a layer in which practically only anaerobic bacteria are found, whilst deeper still there may be no organisms of any kind.

In nature the process of decomposition of organic matter goes on most readily in the superficial layers of the soil in which oxidation takes place very readily. This soil is a porous medium, usually well supplied with air and moisture and organic matter, and is a capital feeding-ground for micro-organisms, which, breaking up the materials contained in it, convert them by oxidation into substances which are capable of being utilized by plants. Most of the organic matter brought into contact with this aerated soil is broken down by the aerobic organisms

it contains, some of the constituents of the organic matter as it is broken up being used by the bacteria, and others being, during the breaking down of the molecule, left in a nascent condition ready for oxidation by the air that has not been used by the organisms. The anaerobic organisms found in the deeper layers of the soil give rise to a second kind of decomposition. As the organisms, originally aerobic, have been washed deeper into the soil, they were no longer able to obtain free oxygen and have in time been compelled to develop the power of wresting oxygen by force, as it were, from the oxygen-containing bodies that come down to them from the surface, usually using part only of the combined oxygen, but setting free another part to be used up in the oxidation of other portions of the organic matter that still remains.

So completely do these two sets of organisms use up the food that is from time to time conveyed to the soil, that at a depth of about 12 feet no micro-organisms at all can, as a rule, be found. The relation of this process to the treatment of sewage is obviously one of extreme importance.

On examining the process by which natural manure is broken down in the upper layers of the soil, it is found that micro-organisms are here present in very large numbers and that the longer the soil is manured and the more it is used for the purpose of breaking down manure, the more active it becomes, for the reason that the micro-organisms not only increase in number, but they also become more energetic in the special direction in which they are called upon to exert their powers. There is a process of natural selection going on—those organisms that can live best under the new conditions flourish and increase in power and activity, and others which might interfere with their work are gradually ousted. If all sewage matter were solid and could be dug into the soil the best and most economical results would easily be obtained.

The difficulty of dealing with sewage matter in solution is no doubt considerable, but this difficulty is materially increased by the fact that the solid matter in it has also to be dealt with—a most difficult combination. In all processes hitherto used in the treatment of sewage, the sedimentation, separation and disposal of the solid matter has not only increased the cost of working, but has rendered the liquid part of the sewage less valuable as manure.

What takes place in nature may also be brought about under artificial conditions, and it is well when we are considering this question of the disintegration of organic matter—whether in nature or in artificially prepared filters—to determine what are the main factors of the process of decomposition and aeration.

In the first place it is necessary to get all solid matter into solution; secondly, to attack the organic matter in solution by means of micro-organisms and so to break it up that the various elements of which this complex material is composed may be thrown into an unstable or nascent condition, so that the oxygen present may have an opportunity of entering into combination and of forming what are called oxidized substances; and in the third place to supply as large a quantity of oxygen in as short a time as possible for the purpose of providing for the needs of the aerobic organisms and of supplying a sufficient amount of oxygen to bring about complete oxidation.

These changes may take place in two perfectly different ways. In the first, oxidation takes place directly, all the nascent substances being satisfied by the oxygen of the air, and the splitting up of the organic matter being carried on by the aerobic organisms. In such a process which takes place in a porous soil well supplied with air and moisture, and also in water which is from time to time well saturated with oxygen, it will be found that little or no putrefactive odour is developed—the marsh gas, the sulphuretted hydrogen and other similar substances, as they are set free, rapidly combining with oxygen to form carbonic acid gas and water, sulphuric acid, etc., and the nitrogenous substances in a similar fashion becoming oxidized into nitrous and nitric acids. In the soil these acids combine with the various basic substances—lime, magnesia and the like—and are thus rapidly removed (from the chemical point of view) and the way is left clear for the formation of fresh batches of similar substances.

In anaerobic putrefaction, on the other hand, the process does not go on in this unobtrusive fashion. The anaerobic organisms, having as it were, to wrest their oxygen from the organic molecules, because there is no free oxygen present, set up a much greater molecular disturbance, and the products of the decomposition—such as sulphuretted hydrogen, marsh gas and ammonia—are thrown off in an unoxidized condition, and in the free form. They are no longer seized upon in the nascent condition, and thus, unless oxidized, become comparatively stable, giving rise to the putrefactive odours so characteristic of rapid anaerobic putrefaction.

The Action of the Dibdin Filters.

First of all it is evident that the sewage brings nutriment to the vigorous micro-organisms that are growing in the filter. In flowing into the filter the sewage probably takes up a certain amount of oxygen, but this cannot play any very important part in bringing about oxidation. As soon as the sewage comes in contact with the micro-organisms the

organic matter is at once attacked by them whether they be aerobic organisms, which many of them are, especially those near the surface, or anaerobic organisms, those in the depth of the filter. As a result of the action of micro-organisms, some of which require carbon and nitrogen from the sewage and oxygen from the air, others of which take all they require from the sewage itself, the substances of which sewage is composed are broken down, and even those parts of the molecules not used by the micro-organisms are so re-arranged that in the presence of oxygen they are readily oxidized. When the filter is full, however, there can be little oxygen in the filter for the reason that the organisms are acting so vigorously that they utilize a certain quantity of the oxygen, whilst their products rapidly combine with the remainder, so that to the extent of the amount of oxygen that can be brought into such a filter, oxidation takes place. As soon as the oxygen has been used up the anaerobic organisms appear to come into vigorous action and to bring about a disintegration of both nitrogenous and carbonaceous substances. When the filter is emptied part of these altered substances pass out with the effluent, and are rapidly oxidized. A considerable quantity of fluid, however, remains in the filter, attached to the coke, and many of the products of the disintegration brought about by the micro-organisms remain in the immediate neighbourhood of these micro-organisms. As air is drawn into the filter when the filter is emptied many of these products (which are very greedy of oxygen) become oxidized, and it will be found that after such a filter has been standing "empty" some little time that a large quantity of carbonic acid gas and a small quantity of ammonia has taken the place of the oxygen, and it is evident that the process of oxidisation goes on actively while the filter is "empty;" as soon, however, as the oxygen is used up the filter again becomes an anaerobic bed, so that only a certain period of rest appears to be necessary in order that the best work may be got out of this filter. The main points to be borne in mind in the working of such a filter as this are (1) that there shall be a sufficient number of micro-organisms of high vitality and activity in the filter. Such a condition can only be attained by careful preparation of the filter bed, and it must not be expected that a coke breeze filter can be called upon to do work at once. (2) That the material supplied to it shall for the most part be in solution or in fine particles so that there may be no mechanical clogging, especially of the surface of the filter, as clogging of the surface must necessarily interfere with the access of oxygen to the deeper layers of the filter. (3) The materials presented to this filter must only have been subjected to the anaerobic process for a sufficient period to ensure the breaking up of the organic

material into ammonia, as it appears that if the anaerobic process be prolonged beyond that point, increasing quantities of substances, which have a deleterious action on the micro-organisms both in the anaerobic tank itself and on the aerobic organisms in the coke filter, are formed.

The Work of the Anaerobic and Aerobic Organisms.

In all the "filter beds" I have examined I have been able to trace the influence of both anaerobic and aerobic bacteria; these two groups of organisms playing very important parts, perfectly distinct and occurring at entirely different stages of the process of disintegration.

It is evident that these two groups of organisms, if the best results are to be obtained in a confined space, must in the main be kept separate up to a certain point, at any rate. So far as we can see at present the anaerobic process is that which is first necessary; this should be allowed to go on up to such a stage that the nitrogenous substances are broken down and there is the production of ammonia; beyond this point this stage of the process should not be allowed to go, otherwise a number of substances appear to be formed in such quantities that they interfere in a most marked degree with the subsequent action, which it is desired to be brought about by the second group—the aerobic micro-organisms—to which organisms even in comparatively small quantities they appear to act as poisons. The anaerobic changes, usually spoken of as "putrefactive," require to be very carefully controlled, and it has been evident to me throughout that this anaerobic phase is often carried too far, with the result that the aerobic nitrifying changes are greatly delayed in the subsequent treatment of the sewage.

In my experiments I have taken the amount of ammonia formed as a measure of the disintegrative change that is going on, as one finds that the amount of ammonia produced gives a fair indication of the work that is being done in an anaerobic bed. Whilst the corresponding multiplication of the anaerobic organisms affords evidence as to the nature of the working activity of the bed it has been found in practice, as already noted, that if this anaerobic process is carried too far, that is, if the fixed oxygen from the organic material is all used up, there comes to be a re-arrangement of the nitrogenous material, and along with this there is a combination between the carbon, carbo-hydrates, the nitrogen of the nitrogenous material, the hydrogen from both, and the formation of distinctly poisonous substances—other than ammonia, marsh gas, carbon di-oxide and water—various carbon nitrogen compounds (amines, amides, etc.) and other combinations, in small quantities which, however, exert a deleterious effect on the further changes.

It seems necessary, therefore, to determine by experiment the exact point at which one should attempt to stop the disintegration of sewage material without the presence of free oxygen, though so far as can at present be gathered a twenty-four hours' storage appears to give fair average results. If this process is stopped at the right stage it is found that it is an easy matter to continue the process of disintegration by aerobic organisms. The work done by these latter appears to be best indicated by the amount of nitrification that takes place: i. e., by the amount of nitrates that appears in the effluent from the bacteriolytic beds. Wherever the two processes—the anaerobic and aerobic—are too closely associated, even when the organisms can live side by side, it is found that the rate at which the individual processes are carried on is to a certain extent, interfered with; perhaps not as far as the ultimate results are concerned, but certainly as regards the rapidity of disintegration and nitrification. At the same time it must be remembered that even under the conditions above mentioned the two can never, so far as we can see, be kept perfectly distinct, although it is possible to obtain a high degree of anaerobic change, followed by well-marked aerobic change, by controlling and modifying the conditions under which the sewage is placed as it is being broken down. Taking first the action of the anaerobic organisms it has been shewn that in regard to the process of putrefaction and fermentation they appear to do a great deal of work by the expenditure of a comparatively small amount of energy. They disturb the molecular constitutions of the more highly organized products of life, now dead material, by wrenching out (or extracting), as it were, a few molecules of oxygen, or of other food material for their own use, thus producing a series of unstable substances: substances unstable partly because of their constitution and partly because they are in a nascent condition, and substances that are readily attacked by other free molecules, especially by those of oxygen. A complex molecule with one or two atoms removed immediately breaks up into smaller groups, or molecules, most of which have free bonds of affinity, to which oxygen becomes readily attached. It is for the reason that we have these nascent molecules that it is necessary to stop the anaerobic process before the re-arrangement becomes complete, and before all the available combined oxygen is used up. One or two molecules of nitrogen, hydrogen or carbon are withdrawn from a complex molecular group, which is thus left in an unstable condition, or there may be the formation of a number of re-arranged and incompletely combined molecules, any of which may undergo oxidisation. It is well known that there are certain organisms (especially those which attack cellulose) which appear to act almost entirely

in the absence of free oxygen. After this process of violent disintegration or "revolution" the aerobic organisms appear to act to much greater advantage; unless, indeed, the sewage be so strong or the anaerobic process be carried so far, that too great an amount of ammonia is produced at once or the more poisonous products already referred to are formed in too great quantities. But this is not the only change that is going on at this stage of the process; a large part of the solid organic matter is peptonized; that is the substances at present insoluble are so far digested by the micro-organisms, or their products, that they are thrown into solution and so converted into a form in which they are more readily attacked; in addition to which, this solution of the solid matter does away with any clogging of the filtering media in the next stages of the process.

The aerobic organisms act on the organic matter in somewhat the same way, but being able to grow and multiply in the presence of free oxygen the whole conditions for oxidisation are naturally more favourable. We have the nascent molecules also formed in this instance because a certain amount of nitrogenous food is necessary for the nutrition of these aerobic organisms; the oxygen and hydrogen are probably derived from air and water, the carbon from carbo-hydrates. As a result of the separation of these carbon and nitrogen atoms we have a re-arrangement of the molecules just as in the case of the disintegration taking place in the anaerobic process. The molecules, with their free bonds are, of course, eager to take up oxygen. As there is plenty of oxygen available rapid and complete oxidisation is the result. We have an amount of "nascent" gases, etc., derived from the breaking down organic matter, the oxygen attacking these gases as they are set free and before they have time to subside into any other permanent or stable form.

As to the Septic Tank Process.

The difficulty of breaking down the solid matter of sewage so as to bring the constituents into solution has for long been one with which engineers have had to contend, but in the tanks provided in this and the Scott-Moncrieff systems, this difficulty has, to a large extent, been overcome, and overcome, apparently, by means of micro-organisms with the power of digesting such portions of organic matter as have not been dealt with in the human stomach and intestines. When the solid matter passes into the tank part falls to the bottom and part comes to the surface, whilst even that which sinks appears after a time to be brought to the surface, as gas in considerable quantity is set free or developed, the gas tending to break down solid particles and adhering to the smaller

particles to carry them to the surface. On examining the sediment taken from the bottom of the tank only a small quantity of granular material and a few broken down fibrils could be found. The leathery mass at the the surface of the tank, which disappears in summer but in winter forms a covering of from 1 to 4 inches thick, contains a large number of bubbles of gas in its substance, while as seen from the inspection well, and from the manholes, streaks and areas of liquefaction of considerable size are to be seen on the upper surface. A similar process of liquefaction is evidently going on on the surface, as, although bubbles of gas are constantly rising, small particles of cellulose appear to be as constantly falling to the bottom of the tank, indicating that the solid matter is being broken down, some of the organic matter is being converted into gas; some is also being thrown into solution—for example, it was found that raw sewage contained 46.8 parts per 100,000 of total solids, whilst the tank effluent, as the result of the changes that had taken place in the tank, contained not less solids, but more (48.6 per 100,000), so that although there was undoubtedly a breaking down of organic matter, as evidenced by the presence of gas in the tank, there was still an increase of organic matter in solution.

The great function of this tank, however, appears to be the disintegration and liquefaction of the portions of sewage in suspension, a destruction especially of the cellulose which, falling to the bottom, remains longer in the tank and so can be more fully acted upon by the anaerobic organisms. It appears too that the urea is probably transformed into carbon dioxide and ammonia. There can be little doubt, from a consideration of the chemical analysis, especially of the tank effluent and of the filtered effluent, that a marked degree of disintegration occurs in the septic tank, and that considerable liquefaction takes place in the filter beds; for example:

TABLE 1.

	Total solids.	Oxygen consumed.	Free ammonia.	Alb. ammonia.	Nitrite.	N. as nitrate.	Total N.	Organic nitrogen.
Raw sewage:								
November 3, 4.....	46.8	6.56	3.6	1.40	0.0	0.0	7.4	4.4
Tank effluent:								
November 4, 5... ...	48.6	4.32	4.9	0.64	Trace.	0.04	6.24	2.2

from which it will be seen that the following changes have taken place in the sewage as it passes through the septic tank: (1), there is a marked

increase in the total solids in solution or fine suspension; (2), there is a reduction of about 33 per cent. of the organic matter as measured by the oxygen consumed; (3), there is an increase of about 33 per cent. in the free ammonia; (4), there is a reduction of about 54 per cent. in the organic or albuminoid ammonia, or 50 per cent. in the organic nitrogen; (5), there is a slight production of oxidized nitrogen and a disappearance of a small amount of the total nitrogen. It is evident then that the sewage is considerably altered.

It was also found that although the dissolved carbonic acid was increased in quantity in the effluent there was still a giving off of carbonic acid gas, nitrogen, marsh gas and hydrogen from the surface of the tank. The increase in the amount of ammonia and of carbonic acid gas, which occurs in this tank along with the diminution in the amount of organic carbon and organic nitrogen indicates that even here the process of purification is commencing, and so long as these products can be got rid of without undergoing transformation into more poisonous products the anaerobic change is useful. As soon, however, as more complicated substances begin to be formed in larger quantities we have evidence that it is time to return to the aerobic fermentation; a point that must be carefully watched in any experimental work that is carried on. A second series of samples, analysed by Dr. Rideal, gave practically the same results as regards percentage purification. The anaerobic change is checked, as far as possible, at the point at which the tank effluent is passed over the small aerating weir. At this point, no doubt, certain gases escape, and others become more fully oxidized, so that we have some of the "waste products" oxidized before they come in contact with the filters.

It having been determined that certain chemical changes take place, it is necessary to see whether we have any collateral evidence as to the nature of these changes, and the means by which they are brought about. The first point was to determine whether these different sets of micro-organisms (anaerobic and aerobic) were present at the various stages of the process; whether, and (2), under what conditions, they undergo multiplication, and (3), whether it was possible by means of chemical and bacteriological examination to notice any association or relation between the two. By means of a series of bacteriological examinations it was found that large numbers of liquefying and non-liquefying anaerobic organisms, many of them gas-producing, were present in the crude sewage and in the septic tank, whilst small numbers of these same organisms were found in the tank effluent and in the filtered effluent.

TABLE 2.

Number and Nature of Anaerobic Organisms found in Different Samples of Exeter Sewage.

	No. of liquefying organisms present per c. c.	No. of non-liquefying organisms present per c. c.
Crude sewage.....	300,000, some fluorescing and many of them gas-producing.	600,000 to 700,000.
Septic tank.....	200,000 to 300,000 (15,000 rapidly liquefying).	300,000 to 400,000.
Tank effluent.....	40,000.	120,000 to 300,000.
Filter effluent (end of filtration).....	100,000.	300,000.
Filter effluent, Well A, after running 3 minutes.....	70,000 (5,000 liquefying rapidly).	500,000.

It was especially noticed that in the crude sewage fluorescent and gas-producing organisms were present in greatest numbers, whilst in the septic tank there was a large number of rapidly liquefying organisms, the largest number of anaerobic organisms was separated from the crude sewage, and in addition to the fluorescing and gas-producing organisms, which were present in large numbers, the sulphur bacillus, a most characteristic sewage organism, was present in large numbers, the non-liquefying anaerobic organisms were also present in largest numbers in the crude sewage, and in the sewage taken from the septic tank the number of anaerobic organisms had certainly not increased, so far, at any rate, as they could be cultivated, but the number of rapidly liquefying organisms, i. e. those that break down or digest the gelatine very readily, had increased so much in number that it was difficult to examine the roll tubes because of the rapid liquefaction of the gelatine to which the tank effluent has been added. In the filtered effluent the number of liquefying anaerobic organisms had fallen very considerably; there was also a fall in the non-liquefying anaerobic organisms. This proportion was not maintained in another sample as regards the non-liquefying organisms, but the fall in the number of liquefying organisms was marked in every specimen examined. The aerobic organisms are also found in large numbers, in fact the largest numbers, in the crude sewage and in the tank contents, the highest number of non-liquefying organisms is found in the crude sewage and in the tank contents, whilst the number in the filtered effluent varied with the rapidity at which the filter was emptied.

TABLE 3.

Number and Nature of Aerobic Organisms found in Various Samples of Exeter Sewage.

	No. of liquefying organisms present per c. c.	No. of non-liquefying organisms present per c. c.
Crude sewage	300,000 to 500,000.	3 to 5 millions.
Septic tank..... ...	150,000 to 200,000 (15,000 rapidly liquefying).	3 to 5 millions.
Tank effluent.....	300,000 to 400,000.	1 million.
Filter effluent (end of filtration).....	100,000.	900,000.
Filter effluent, Well A, after running off for three minutes....	30,000 (3,000 rapidly liquefying).	3 to 5 millions.

Having now determined that these organisms of both types were present, it was necessary to determine whether the various organisms separated would grow in the effluent or not. With this object in view a quantity of the filtered effluent was passed through a Chamberland filter and decanted into a series of large sterile tubes. These were seeded with samples of the various organisms, separated into pure cultures. Duplicate sets of such tubes were made in each case. Thirty c. c. of the sterile filtrate was inoculated from a gelatine culture of a special organism; plate cultivations were made from these dilutions at the end of twenty-four hours, by which time certain multiplication will have taken place and groups of organisms will have become broken down into their constituent organisms. Five days later plates were again made from the same tubes in order to determine what degree of multiplication had gone on in the interval, it being argued that should multiplication of organisms take place there must be some breaking down of the organic matter contained in the sewage. In every case but one multiplication had to be reckoned almost in millions, the numbers sometimes running up from 200,000 to 2 and 3 hundred millions. In one case, however, it was only from 600,000 to 20 or 30 millions.

TABLE 4.

Shewing the rate of Multiplication of the Organisms separated from the Exeter Sewage when placed in sterile filtered Tank Effluent.

Source of Organism.	Control 24 hours.	5 days later.
Crude sewage No. 1.....	200,000 to 400,000.	5 to 10 millions.
" " 2.....	200,000.	200 to 300 millions.
" " 3.....	60,000 to 80,000.	30 to 40 millions.
" " 4.....	600,000 to 700,000.	1,000 millions.
" " 5.....	More than 2 millions.	1,000 millions.
Tank effluent " 6.....	600,000 to 700,000.	Several 1,000 millions.
" " 7.....	600,000 to 700,000.	20 to 30 millions.
" " 8.....	1,400,000 to 1,600,000.	40 to 50 millions.
Mixture of Organisms.....	200,000.	Very numerous.

These estimates only give general indications as to the nature of the processes going on, but they may be accepted, when taken in conjunction with the following figures, as especially shewing that most of the organisms grow with great rapidity in the sewage as it is found in the tank. It should be noted that there was the most rapid multiplication in the cases of samples Nos. 4, 5 and 6, and in the case of a mixture of organisms taken from several cultures; thus indicating that in these samples we must probably look for the most active chemical changes. The mixture of organisms caused rapid liquefaction of gelatine and coagulation of milk, this latter being followed by peptonization and liquefaction of the casein.

It is well known that nitrates and nitrites increase in quantity if sewage effluents are kept for some time before they are examined. In the tank effluent under observation nitrates and nitrites were present in very small quantities when perfectly fresh. In order to determine how far the increase of nitrates observed was brought about by different micro-organisms, samples of the tank effluent were filtered through Pasteur Chamberland filters into sterile flasks and tubes. After these had been kept for some time and the sterility of their contents tested, they were seeded with cultures of the various organisms, separated by the plate-culture method. Duplicate sets were made. These were allowed to grow at the ordinary temperature; one set being examined at the end of three, the other at the end of six days. In one series of experiments there was a very great increase in the amount of nitrates found. There was in nearly every case decrease of nitrites, this varying considerably in different cases, but being most pronounced where the nitrates were highest. The results obtained, however, correspond fairly

in all three sets of specimens; the process of nitrification or the formation of nitrates going on with considerable activity although the sterile filtrate remained absolutely stationary.

TABLE 5.

Shewing amount of nitrogen as nitric and nitrous acid in sterile filtered tank effluent and in the same effluent to which various micro-organisms and mixtures were added, growth being allowed to go on for six days.

	N. as nitric acid per 100,000 parts.	Percentage increase of nitric acid.	Relative amount of N. as nitrous acid, 10 being taken as the standard of measurement.
Sterile tank effluent.....	0.661	0	10
Do. + organisms from crude sewage No. 1.....	1.417	+114 p. c.	6
Do. do. No. 2.....	1.386	+109 p. c.	10
Do. do. No. 3.....	1.291	+ 95 p. c.	4
Do. do. No. 4.....	1.417	+114 p. c.	6
Do. do. No. 5.....	1.658	+147 p. c. E.	1 E.*
Tank effluent No. 6.....	0.3	— 55 p. c. O.	Excessive O.*
Do. No. 7.....	0.819	+ 24 p. c.	8
Do. No. 8.	0.567	— 15 p. c.	8
Mixture of 3 organisms.....	1.449	+119 p. c.	8
Mixtures of all the organisms separated.....	1.23	+ 86 p. c.	10

* Compare these figures with those similarly marked in Table 6.

TABLE 6.

Second series made with two sets of sterile tank effluent, one of which contained a higher proportion of nitrogen as nitric acid per 100,000 parts than the other. The control, i. e., the sterilized fluid in the case of Sample A, contained only 0.187 per 100,000 parts. Sample B contained 0.325.

	Sample A.				Sample B.			
	N. as nitric acid per 100,000 parts after growth of		Percentage increase or decrease of nitrates.		N. as nitric acid per 100,000 parts after growth of		Percentage increase or decrease of nitrates.	
	3 days.	6 days.	3 days.	6 days.	3 days.	6 days.	3 days.	6 days.
Crude sewage No. 1	0.200	0.200	+ 7 p. c.	+ 7 p. c.	.....	.....	.....	.....
" " 2	0.162	0.300	—13 "	+60 "	.....	.....	.....	.....
" " 3	0.09	0.250	—53 "	+33 "	.....	.....	.....	.....
" " 4	.200	.....	+ 7 "	.....	.....	0.287	.....	—22 p. c.
" " 5	.....	.....	.....	.....	0.225	0.387	—31 p. c.	+19 " E.*
Tank effluent No. 6	.....	.....	.....	.....	0.287	0.150	—22 "	—54 " O.*
" " 7	.....	.....	.....	.....	0.130	0.269	—60 "	—19 "
" " 8	.....	.....	.....	.....	0.225	0.265	—31 "	—19 "
Mixture of 3 Organisms	0.218	0.265	+16 p.c.	+41 p. c.	.....	.....	.....	.....

* Compare these figures with those similarly marked in Table 5.

In one or two cases a pure culture of a single organism gives as high an amount of oxydized nitrogen as does inoculation of the whole or several organisms contained in the effluent. It seems to be necessary for the disintegration of cellulose and other resistent organic matter, that it should be in contact in concentrated form with the micro-organisms in the tank for a lengthened period. Owing to the slow flow of the sewage through the tank the solid matter is not stirred up except by such gas as is formed, and consequently only lighter particles that have been partially decomposed are brought to the surface after they have been settled.

The Dibdin Filters when dealing with Septic Tank Effluent.

I have examined samples of the coke breeze; samples of the tank effluent before it goes into the filter, and samples of the filtrate effluent, with the object of determining approximately the number and the general nature of the organisms found at these various points in the filter beds, especially at the surface.

Aerobic organisms are here present in considerable numbers, but anaerobic organisms are also present, probably washed over from the filter tank; in the deeper layers of the filter beds these latter are, as it were, indigenous It is evident from the conditions under which the two processes in the tank and in the filter are carried on, that there are both facultative aerobes and anaerobes amongst the micro-organisms doing the work, and that although it is possible to group the processes generally it is impossible under present conditions to draw a sharp line of determination between the two sets of organisms. When the sewage comes from the tank it is, as we have seen, first aerated and then passed into the filter so that the bulk of it in its passage downwards comes in contact with a considerable surface of the filtering material, trickling down slowly and carrying with it the oxygen that has already been taken up and intangling a still further amount to be immediately utilized. In summer, when there are periods of dry weather followed by heavy rains and then again by a dry period, the stay in the filter would not correspond to the strength. Owing to the time that it takes for the sewage to pass through the tank it is probable that this full period might be very materially shortened, and that the filter might be discharged as soon as the oxygen contained in it is used up, as it has been found that even during the period that the filter is filling the proportion of carbon dioxide is enormously increased even in the upper layers of the filter; this in itself affording strong proof that the organisms in the filter are extremely active, and are attacking the carbo-hydrates and break-

ing them down rapidly. It must, therefore, not be assumed that the whole, or even the greater part, of the changes take place whilst the filter bed is full; indeed it appears that the micro-organisms on the surface of the filtering material are probably more active during the stage that air is being drawn into the filter as it is emptied from the bottom than during the time that the filter is full. The process must then be looked upon as mechanical only in so far as the fine filtering material attracts all suspended matter to the mass of actively growing micro-organisms on its surface. In addition to this a considerable part of the organic matter in solution is taken up by the layers of micro-organisms as the filtered material slowly trickles over the exposed surfaces of the filtering medium. If there could be an excess of oxygen kept in the filter there seems no reason to doubt that the whole of the organic matter might be converted into nitrates and nitrites; matter which at present appears to be converted rather into ammonia, and perhaps some free nitrogen. One of the great advantages of emptying and refilling the filter is that the products of deposition, which might interfere with the activity of the aerobic organisms are regularly washed away, each discharge of the filter removing these products and leaving the organisms free to deal with the next batch of sewage as soon as it is thrown in, so that here the conditions for the continuous activity of the micro-organisms are exceptionally favourable. The sewage brings a large quantity of food supply, mostly insoluble and rapidly attacked, whilst at each emptying of the filter the effete products, which usually play such an important part in interfering with the activity of the micro-organisms, are washed away.

These effete products are the nitric and nitrous acids, carbon dioxide in solution, ammonia in solution and some of the gases already referred to. It must be remembered in this connection that the effluent must not be judged on the basis of a drinking water; it must be judged rather on the amount of readily oxidisable materials that it contains, and on the facilities that there are for rapid oxydation of these substances into those of more stable character. Whether the effluent be thrown on to land or discharged into well-oxygenated water (especially if this be tidal or sea) the criterion as to the fitness of the fluid to be discharged must be the proportion of oxidisable substances that have taken the place of the original organic matter in the sewage and the relation of nitrogen to chlorine must always be considered in connection with the proportions of oxidisable and non-oxidisable nitrogen. If the proportion of oxidisable or oxidised nitrogen be low, the filters are not doing their work properly; if the proportion be high the mere total amount of nitrogen is not of great importance, as the filters are doing what is required of them. They are breaking down the organic matter into such a condition that

it will rapidly become mineralized in the soil or in well-oxygenated water. The results of oxydation are so marked that a more complete saturation of the tank effluent with oxygen before it is allowed to pass into the filter might accelerate the process. This might be done by increasing the length of the channel and increasing the number of weirs. Such solids as remain in the tank effluent are kept back on the films covering the coke breeze, and at the same time organic matter in solution appears to be taken up by the organisms in these films as the fluid trickles through the filter. The organic matter thus brought, practically serves as fresh food for the micro-organisms by which it is disintegrated; part of it being used up by the organisms and part passing into solution, or passing off in the form of the various gases found in the filter. These changes go on so long as any oxygen remains in the filter, whether it be full or empty of sewage. Naturally, therefore, when the filter is full there can be no access of fresh oxygen from the outside, and what is there is soon used up as the filter is empty, therefore fresh oxygen is brought, and at the same time the effete products, which prevent further action of the micro-organisms, are washed away and the organisms are left free to act upon the next batch of food that is supplied to it. The filters, therefore, are probably acting most actively during the period that they are empty. Peptonisation, liquefaction and digestion of the solid organic matter goes on very rapidly, both in the septic tank and in the filters. The filter beds do not get clogged, and will run almost continuously (intermittently) so long as the period necessary for full aeration is allowed between each discharge of tank effluent. Admitting that the general indications go to shew that the filter only does its best work when the number of micro-organisms deposited on the surface of the filtering material has become sufficiently large and when they receive a full supply of oxygen, it appears probable that the organisms carrying on the work of disintegration of sewage are almost entirely of a non-pathogenic character. The organic matter in the filtered effluent is in such a highly unstable and rapidly oxidisable condition that it appears to be suitable for discharge on to land or into a large volume of well-oxygenated water, especially when such water is not to be used for drinking purposes.

As to the Influence of Variations in the Flow of Sewage.

As soon as the whole of the sewage from any area came to be treated it was evident that it was impossible to obtain the best results unless the flow could be made regular, as the filter beds would have to be made capable of doing the full amount of work required of them

during the period that there is the greatest flow of sewage; during the remainder of the day they would be working with a great waste of energy, while if, on the other hand, they were constructed for the purpose of taking the average amount of sewage, they would, at one part of the day, be overworked and sending out a bad effluent, whilst at other parts they would be called upon to do less than they could actually perform. It is not as if it were possible as in the case of chemical precipitation or chemical treatment of any kind, or even in irrigation work, to increase the amount of chemicals as the sewage increases, or throw the sewage on a larger area of land. When a filter bed becomes thoroughly ripe, that is, when the micro-organisms in it are acting most efficiently, there is one quantity of sewage and one alone from which the best and most economical results will be obtained; this quantity should always be kept running on to the filter beds.

General Conclusions.

It is evident from all these observations:

(1.) That these biological beds, whether anaerobic or aerobic, all require a certain period during which the micro-organisms may multiply and become active.

(2.) That if the best work is to be got out of these "filter beds," they should be kept in as stable a condition as possible, i. e., the anaerobic filter should always be worked under anaerobic conditions, and the aerobic filter under aerobic conditions. Otherwise the special organisms concerned in the special processes become weakened and the filter no longer does its work properly.

(3.) This being the case it is obvious that whatever form of filter be used, it must be gradually worked up to its best, and then the conditions under which this "best" is obtained, carefully maintained.

(4.) It does not seem to matter what form the anerobic bed may take, and twelve hours in a full sewer was in one case quite sufficient to bring about the necessary anaerobic changes—liquefaction and ammonia formation; but the conditions under which the aerobic changes are carried on should be more carefully attended to, and so far as my experience goes, the separated well aerated trays give better results than any of the other filter beds examined, though I believe that Lowcock's or Ducat's methods may, other things being equal, give extremely good results. Complete and rapid aeration in the presence of numerous and vigorous aerobic micro-organisms should certainly give the best results, especially if the constituent molecules of organic matter can be presented

to the action of these aerobic organisms very quickly after the disruptive anaerobic process has been initiated.

(5.) Sewage to be efficiently treated by the bacteriolytic method should not be worked upon in too concentrated a form, whilst dilution between the two stages of purification and then again after the second process will always ensure more rapid oxidation of the products of decomposition.

(6.) One of the means that we have of learning indirectly the power of doing liquefying work in the disintegration of the organic matter is to determine the relative number and activity of the liquefying organisms that are met with in the aerobic and anaerobic areas. Speaking roughly, and taking several analyses as the basis for calculation, one finds that the rapidly liquefying organisms are, anaerobic to aerobic, as three to one. That is, taking a hundred anaerobic organisms, one would find that on an average thirty of these are actively liquefying organisms, i.e., they have the power of peptonising gelatine, and probably also of digesting similar nitrogenous substances; whilst of one hundred aerobic organisms only ten would be endowed with a similar power of digesting this organic matter. This is probably the reason that the anaerobic organisms are more useful in the early stage of the process, where it is necessary to throw the solids into solution; for, until this state is reached, it is impossible to attempt to act rapidly upon the sewage in bulk by means of micro-organisms.

G. SIMS WOODHEAD.

24th December, 1898.

APPENDIX G.

"THE PURIFICATION OF SEWAGE BY BACTERIAL OXIDATION."

This name is given to a protected process developed by the late Col. Geo. E. Waring, Jr. The process is based upon results obtained by experiments made by him at Newport, Rhode Island, in 1894. Without describing these, the conclusions reached by him may be summed up as follows:

1. The suspended matters in sewage may be retained by straining through some coarse material and subsequently completely destroyed by aeration.

2. If conducted intermittently the process may be carried on indefinitely without renewal of material, and the effluent will compare with that from chemical precipitation plants.

3. By passing the effluent constantly through aerated filter beds of proper design, "practically all of the dissolved organic matter in sewage can be removed, and purification to a drinking water standard can be obtained."

Since these experiments were made, disposal works on this plan have been installed at Willow Grove Park, near Philadelphia; Tuxedo Park, N. J.; Homewood, a suburb of Brooklyn, N. Y.; Albion, N. Y., and East Cleveland, Ohio.

The Willow Grove plant serves a park of that name established by the Philadelphia Traction Co. as a suburban pleasure resort. Through the courtesy of Mr. John B. Parsons, President and General Manager, and Mr. W. S. Twining, the Chief Engineer of the Company, a visit was made to inspect the plant.

Designed for a flow of from 80,000 to 100,000 gallons of sewage per day, the maximum rate up to the visit referred to, had approximated 160,000 gallons per day. The amount fluctuates very greatly, depending on the number of persons who happen to be attracted to the place for the fraction of a day, and, as it comes principally from afternoon and evening visitors, and with no trade refuse, it cannot be classed as a normal sewage.

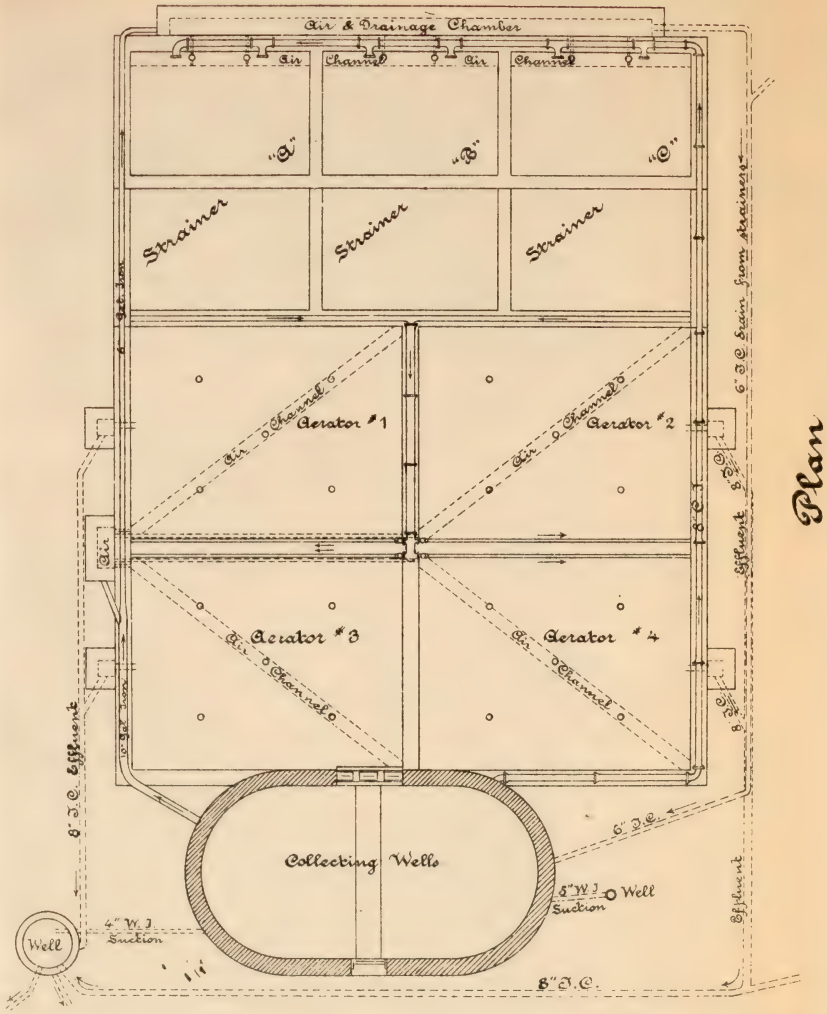
It is delivered first to a receiving well, (Plate XIV.,) having a capacity of some 12,000 gallons, where it passes through two sets of screens, the first consisting of ⅝-inch iron rods spaced ½ inch apart, and the second a netting of galvanized iron with a ¼-inch mesh. The former intercepts all coarse papers, rags, lemon-peels, etc. The finer screens were said to require cleaning but about twice in the season of about four months, while during that time about a foot in depth of sludge accumulated in, and is removed from, the bottom of the well.

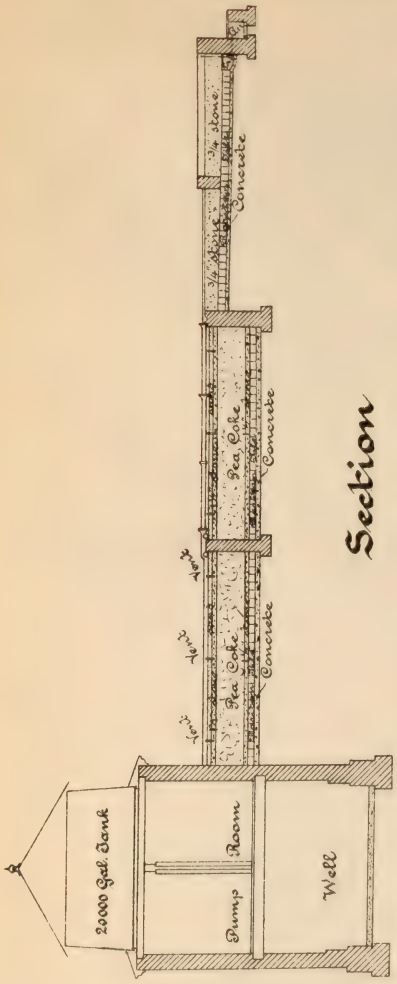
From the receiving well the sewage is pumped to distributing tanks placed above the roof of the well-house. These serve to equalize the flow by storing sewage received when the discharge is heavy, and delivering it during hours of minimum flow.

From the tanks the sewage flows to what are termed *strainers*. There are three of these, 22 feet by 32 feet in plan, each divided by a partition wall into two equal parts; suitable openings along the bottom of these walls leave a certain space through which the sewage may flow. Both parts of the strainer are filled with stone, broken to sizes of from ½ inch to 1 inch, to a depth of two feet, under which are laid several lines of hollow tiles with open joints, which collect the effluent. Entering the outer compartment of one of these strainers, the sewage passes down, depositing its sludge on the broken stone by the way, and then under the partition wall and up through the other compartment.

The effluent, which is now practically deprived of its solid matter, passes into perforated channels by which it is distributed over the surface of *aerators*, so called, of which there are four, 24 feet by 32 feet in plan. These are filled with coke crushed to the size of peas, covered with a layer of sand to a total depth of five feet. The coke rests upon a layer of hollow tiling which collects the filtrate. The tiles are laid close, but without cement, over the entire floor of the aerator. The filtrate is, after passing through a well used for testing purposes, delivered into an ornamental pond, whence the water is pumped for sprinkling the roadways and lawns.

The three strainers are used in rotation, one filling while the next is emptying, and the third lying idle or being cleaned. After a strainer is clogged with sludge it is cut out from the others and drained; then air, under a pressure of about three ounces, is forced through the hollow drain tiles, and finds its escape through the sludge-covered stone, permeating it and oxidizing the impurities, so that it is left comparatively clean, dry and without offensive odor. A certain amount of sediment appeared to remain on the broken stone, but more in the nature of dry earth than sludge. The water which has been drawn off from the strainer is added to the crude sewage and undergoes treatment again.





Sewerage Commission
of the
City of Baltimore
Waring's System of Bacterial Oxidation
Willow Grove Park, Pa.
1899

Scale of Feet
0 5 10 20 30 40 50

Sewerage Commission
Mendes Cohen
F.H. Hambleton
E.L. Bartlett

Kenneth Allen
Prin. Asst. Engr
Feb. 25, 1899

The flow through the coke filters or aerators is continuous, and, as in the strainers, the drain tiles serve as carriers for the compressed air. This is forced up through the filtering liquid, stimulating the bacterial action by which the organic matter remaining in solution is oxidized, and controlling by its pressure the rapidity of filtration.

The effluent when seen was slightly opalescent, but is said to be frequently taken from the collecting well as a beverage with no harmful results.

There are air vents running up through the top layer of the aerators to prevent a disturbance of the filtering material from an excess of air pressure. The air appeared in bubbles fairly distributed over the surface of the aerators where there was a considerable growth of green algae.

But two men are required to attend to the work during the busy season.

The Willow Grove Park plant serves as a type of this system, but, being the first of its kind, experience has indicated improvements as to details by the adoption of which a yet higher efficiency, it is claimed, may be attained. It has been suggested as preferable, for instance, to provide independent ducts for the compressed air and the effluent from strainers and aerators. The relative proportions of the two parts of the strainers, their depth and the depth of the aerators are also points concerning which there is probably required more definite knowledge, to be had only by experience, in order to obtain the best results.

Experience, too, appears to be lacking in order to predict with any certainty the cost of operation. With the Willow Grove plant the power required for the fans and pumps was supplied from the Traction Company's power-house, and so its cost would be no criterion for other works; but aside from this the expense was not great, probably less than $1,000 for the season.

Although similar in many respects to Lowcock's system, it differs from the latter in that it deals with crude sewage, the sludge as well as the dissolved impurities being disposed of by forced aeration, whereas the Lowcock filter would clog if the solids were not previously disposed of by chemical precipitation.

APPENDIX H.

THE PENNSYLVANIA SANITATION COMPANY'S METHOD OF SEWAGE PURIFICATION.

This process, which consists in a combination of aeration and filtration, may be best illustrated by describing the plant in use at Reading, Pa., where, so far as we are informed, is the only establishment as yet undertaken by this Company. Through the courtesy of the City Engineer, Mr. Samuel S. Hoff, an inspection of the plant was recently made and data concerning its operation obtained.

The population of Reading today is estimated at between 70 and 80 thousand, of which perhaps one-tenth only are, as yet, connected with the sewers. The separate system of collection has been adopted and the volume now treated averages about two million gallons per day.

The sewage enters one of two screen chambers, each 20 feet in diameter, at the pumping station, where it is distributed from the 54-inch sewer upon a layer of coke broken to a size of from 2 to 3 inches. This layer is 12 inches thick and is enclosed between gratings of wrought-iron bars. The upper grating may be raised in sections for the removal and renewal of the coke. It is covered with a wire netting, which intercepts such grosser matter as finds its way to the pumping station.

Each of the two chambers contains 4½ tons of coke. This is used until clogged so as to impede the proper flow of sewage, and is then removed, drained, dried by steam, mixed with bituminous coal and burned under the boilers. If left exposed for any length of time it soon becomes very offensive. From 18 to 20 tons of coke are used in this way per month.

From the screen chambers the sewage is pumped through a cast-iron main under the Schuylkill River to the filters. There are two of these, one supported above the other. The upper filter consists of ten beds, 25 x 50 feet in size, and is composed of 14 or 15 inches of sand laid on 6 inches of cinder from ½ inch to 2 inches in diameter. The whole is supported by a grating of ⅞-inch wrought-iron pipe.

The force main runs along and above the centre of the filter and discharges the sewage through ordinary gate valves to laterals consisting of 8-inch galvanized iron pipes placed between the separate beds, and these in turn discharge to semi-circular galvanized iron channels 6 inches in diameter, spaced 4 feet apart. The sewage flows over the edges of these channels onto wooden gratings partly covered with sheet-iron,

which serve to distribute the sewage over the sand and prevent the washing of its surface.

The sewage is delivered continuously to about six of the ten compartments until, with a depth of a foot above the filter, the flow is too greatly impeded in any compartment. This is then drained, a thin slice taken off the sand by a shovel, and then the whole well spaded and re-surfaced with fresh sand. This is generally found necessary after about 30 hours application of sewage.

Passing the upper filter, which is supported on cast-iron columns, the effluent drops 10 feet as a shower to the surface of the lower filter. This is composed of 2 feet of sand on top of 8 inches of coarse slag, the whole resting on a bed of concrete. Drainage channels averaging 13 inches by 8 inches cross this bed at intervals of 12½ feet to afford aeration as well as drainage. They are covered with iron gratings and terminate at their upper ends with vent pipes extending through the surface of the filter. The effluent passes from these channels to a concrete effluent channel, which conveys it to the river bank. The lower filter is cleaned twice a year, which operation takes some 20 hours, and during this time the sewage passes to the river untreated.

The total area covered by each filter is 0.287 acre, so that the average rate of filtration now approximates 7 million gallons per day per acre of each filter.

The effluent from the filter to the river appeared limpid and pure, and the channel, including a paved slope to the river water, was clean and with but slight evidence of sewage fungus among the green mosses just at the end of the channel. A sample taken in a glass showed a small amount of fine flocculent matter, but was without other evidence of impurity, and was said to be occasionally used as a beverage.

Unfortunately, no analyses have been made of the effluent while working under present conditions, so that the only ones available are not considered of sufficient value to insert here in full, although it may be stated that in the two analyses made 10 and 20 days, respectively, after the works were put in operation the reduction in albuminoid ammonia and bacteria were as follows:*

	Sample I.		Sample II.	
	Albuminoid Ammonia.		Albuminoid Ammonia.	
	Parts per 100,000	Bacteria.	Parts per 100,000	Bacteria.
Crude sewage.....	0.140	27,232.8	0.730	49,867.3
After coke screening.....	0.090	19,152.4	0.060	16,542.7
" passing upper bed....	0.020	516.6	0.025	232.6
" aeration	0.015	126.0	0.040	81.2
" passing lower bed...	0.025	22.0	0.055	0.2

*See Engineering News, January 27, 1898.

A marked purification is seen to result from the preliminary process of straining, chiefly due, in all probability, to the solids retained in the coke rather than to any actual alteration in either the sewage or sludge. Considering the rate of filtration, if correctly given at 2 million gallons per day, as claimed at the time the samples were taken, the results of the above analyses appear remarkably satisfactory. The destruction of bacteria indicated as occurring during the fall of 10 feet from the upper filter to the other is believed to be anomalous and misleading, and Messrs. Emil Nuebling (Superintendent and Engineer), and Allen Hazen (Consulting Engineer), in a report to the Water Commissioners of Reading, say: "We have not been able to discover the slightest reason for supposing that any bacterial purification is effected in this way."

The cost of the filtration plant complete, excluding pumping plant, force main and land, was about $90,000, and the annual cost of maintenance has been about $9,000.

During the coldest weather of the past winter, when the thermometer remained about 14° below zero for several days, no ice formed on the filter beds except where in contact with the iron work, and this was easily removed. For the purpose of excluding frost the sewage was applied continuously to all ten beds, being interrupted only as one or more required cleaning. It was delivered on the filter with a temperature of 42°, and up to the time of reaching the effluent drains it had only fallen to 40° Fahr.

It may be added that there was no appreciable odor about the works.

APPENDIX I.

THE SCOTT MONCRIEFF SYSTEM OF SEWAGE TREATMENT.

This process has attracted much attention recently from the very favorable results which analyses of its effluents have developed in the hands of competent and reliable chemists.

The first installation of this system was at Ashtead, England, where the experiments, observations and analyses referred to were had. We learn that a plant has recently been established at Caterham, England, but of this we have not been able to obtain reliable information, nor was Mr. Mansergh more successful in this regard.

We are dependent, therefore, for our description of the process upon the facts we have been enabled to collate from correspondence with which we have been favored by Dr. G. Sims Woodhead and Dr. Samuel Rideal, of London, and from such descriptions as we have found in various published articles in technical journals.

Its essential features consist first in what is termed a "cultivation tank." This tank is filled to a depth of 14 inches with a coarse material described as flint chips. To the under surface of this material is introduced the collected sewage, which has previously been freed by deposition from grease and sand. The sewage passes through this material by continuous upward flow and is here exposed to the action of anaerobic and liquefying bacteria. Thence it is conducted through a suitable channel to a series of filtration trays through which the partially treated sewage passes by gravity.

These trays in the Ashtead installation were arranged in a series of nine, superposed on each other by a suitable system of framing.

Each tray, seven inches in depth, with perforated bottom, contained six inches of broken coke of a size that would pass through a one-inch ring.

Between the bottom of each tray and the surface of the filtering material in the one beneath it, an interval of from two to three inches was left. As the sewage discharged over the surface of the upper tray passed in thin streams through the vacant spaces and trays beneath the first, it was exposed at each interval to a degree of aeration and

then to a new filtration, so that the process was carried on progressively, as it were in distinct zones—an examination of the effluent from each tray clearly revealing the progress of the purification as the flow proceeded.

We append hereto a table giving chemical analyses of the effluents from the several successive trays, together with a graphic diagram by Dr. Rideal, being an excerpt from his paper in the Journal of the Sanitary Institute, vol. xix., part iv., showing the progressive oxidation of the nitrogenous matter.

A remarkable feature of this process is that these surprisingly satisfactory results are obtained in something less than the ten minutes required for the passage of the sewage through the several trays.

TABLE SHOWING SUCCESSIVE STAGES OF BACTERIAL MINERALIZATION:*

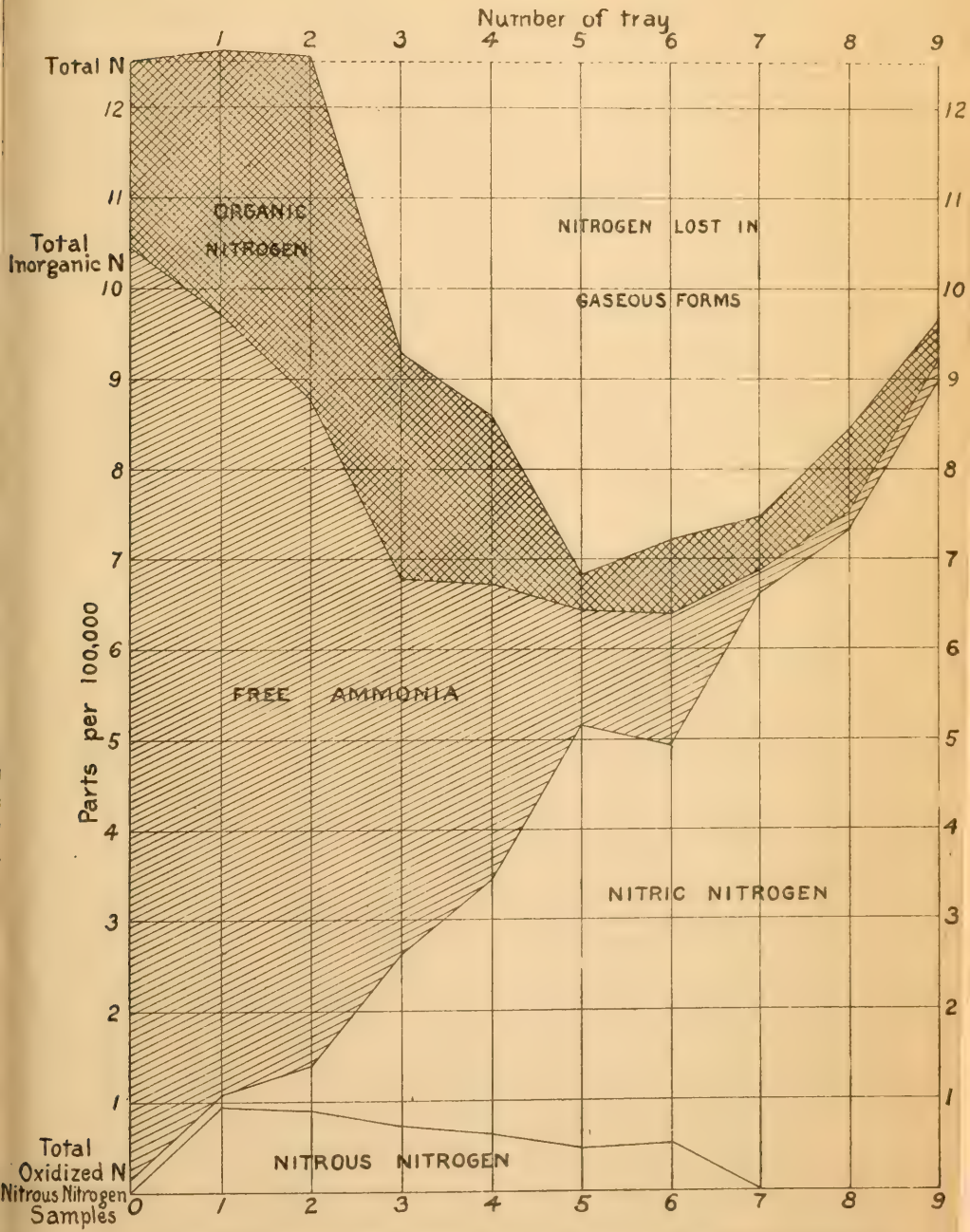
Parts per 100,000.

Sample From	Chlorine.	Ammonia.		Nitrogen.	
		Free.	Albuminoid.	Nitrous.	Nitric.
Tank	9.00	12.50	1.50	0.00	0.120
1st Tray	9.00	10.50	1.25	0.99	0.096
2d "	8.50	9.00	1.00	0.90	0.480
3d "	8.50	5.00	0.60	0.78	1.870
4th "	8.00	4.00	0.35	0.66	2.760
5th "	7.75	1.50	0.15	0.48	4.680
6th "	8.00	1.75	0.35	0.51	4.416
7th "	7.50	0.35	0.30	0.00	6.600
8th "	7.50	0.20	0 65	0.00	7.320
9th "	7.50	0.25	0.60	Tr.	9.000

*Engineering Record, Vol. XXXVIII, p. 562.

FIG. 4

RESULTS OF ANALYSES OF SEPTIC SEWAGE AND EFFLUENT FROM THE VARIOUS TRAYS OF THE SCOTT-MONCRIEFF PLANT AT ASHTEAD, ENGLAND, OBTAINED THROUGH DR. SAMUEL RIDEAL. JANUARY 25, 1898


Number of tray
1 2 3 4 5 6 7 8 9
Total N
Total Inorganic N
Parts per 100,000
ORGANIC NITROGEN
NITROGEN LOST IN GASEOUS FORMS
FREE AMMONIA
NITRIC NITROGEN
NITROUS NITROGEN
Total Oxidized N
Nitrous Nitrogen
Samples
0 1 2 3 4 5 6 7 8 9
12 11 10 9 8 7 6 5 4 3 2 1

RATE OF FILTRATION ABOUT 1,200,000 GALLONS PER ACRE PER DAY.

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